DOCUMENT RESUME

ED 138 206 HE 008 871

TITLE	The Role of the Dissertation in Doctoral Education at the University of Michigan. Report of the Dissertation Review Committee, Horace Rackham School of Graduate Studies.
INSTITUTION	Michigan Univ., Ann Arbor.
PUB DATE	Jul 76
NOTE	337p.
EDRS PRICE	MF-$0.83 HC-$18.07 Plus Postage.
DESCRIPTORS	*Degree Requirements; Doctoral Degrees; *Doctoral Programs; *Doctoral Theses; *Educational Alternatives: *Educational Needs; Graduate Study; Graduate Surveys; Higher Education; Program Administration; Research; Research Projects; School Surveys; *State Universities; Tables (Data)
IDENTIFIERS	Nonacademic Careers; *University of Michigan

ABSTRACT

In 1974, the Dissertation Review Committee surveyed faculty, doctoral condidates, and alumni of the University of Michigan as part of a review of dissertation requirements. The committee had four objectives: (1) to examine the dissertation as a learning experience, giving attention to the time required and the interaction of the student with the faculty in the selection, execution, and evaluation of the research project; (2) to review the relationship between the dissertation phase and course work; (3) to consider the effectiveness of the dissertation phase as a component of training for nonacademic careers, giving attention to alternative experiences that might be offered in some programs; and (4) to recommend changes in the procedures by which the graduate school administers the dissertation requirement so that the system can be responsive to educational needs while maintaining scholarly excellence. Survey results are presented in narrated tabular form, and recommendations are described. (Author/MSE)

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**Horace H. Rackham
School of
Graduate Studies**

THE ROLE OF THE DISSERTATION
IN DOCTORAL EDUCATION
AT THE UNIVERSITY OF MICHIGAN

Report of
The Dissertation Review Committee
The Horace Rackham School of Graduate Studies

July, 1976

Task Force, November, 1973

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INTRODUCTION

During the 1965-74 decade some 250,000 Ph.D. degrees were awarded by American universities, of which almost 7,000 were conferred by The University of Michigan. For the nation as a whole this represented a total increase of 85 percent from 1965 to 1974, and an annual rate of growth of eight percent. But the near decade divides rather sharply at the 1970-71 academic year, when the annual 13 percent growth in Ph.D.s of the previous four years declined to 3 percent in the ensuing four years, with a drop of 1 percent in the number of degrees conferred between 1972-73 and 1973-74. In short, the steeply rising trend, which emerged after World War II, has apparently begun to reverse itself over the last few years, although the number of new Ph.D.s continues well over 30,000 annually. These data are all shown in the following table.

Number of Ph.D. Degrees Awarded

	United States			The University of Michigan		
	Number	Percent Change	Annual Rate	Number	Percent Change	Annual Rate
1939-40	3,290					
1949-50	6,633	102	7			
1959-60	9,829	48	4			
1965-66	18,237			564		
1966-67	20,167		11	486		-14
1967-68	23,098		14	542		12
1968-69	26,188		13	688		27
1969-70	29,866		14	705		2
1970-71	32,107		8	763		8
1971-72	33,330		4	765		0
1972-73	34,100		2	742		-3
1973-74	33,700		-1	791		7
1974-75				661		-16
1965-66 - 1969-70	87,681	64	13	2,280	25	6
1969-70 - 1973-74	129,403	13	3	2,975	12	3
1965-1974	217;084	85	8	5,255	40	4

Source of national data: U.S. Department of Health, Education and Welfare, Office of Education, Statistics of Higher Education, 1957-58 and Projections of Educational Statistics to 1983-84.

The University of Michigan displays a pattern, which differs somewhat from the nation as a whole. The year-to-year changes at a single university are erratic because of the tendency to periodic bunching among diverse departments where students take characteristically differing periods of time to complete the degree. Nevertheless, doctoral graduates increased by only forty percent here during 1965-74 period, about half as much as the national total. Most of this much lower rate is accounted for by the 1965-69 period, when the number of Michigan Ph.D.s conferred rose at an annual rate of 6 percent, contrasted to 13 percent nationally. Since the 1969-70 academic year, however, the increase in the number of Michigan Ph.D.s awarded has occurred at the same annual rate as the national. Whether the 16 percent drop in the most recent academic year reflects another shift or simply a random "short fall" in the number of candidates completing their work cannot be determined from the data at hand. Nevertheless, it is apparent that at Michigan as well as other universities the rate of growth in Ph.D. completions has entered a period of decline, which may also be reflected in a continued reduction in the absolute number of degrees conferred.

In recent years a number of studies of higher education have warned of falling demand for Ph.D.s to fill the ranks of college faculties, as both birth rates and college attendance rates decline. Perhaps the slowing up in Ph.D. degree awards already reflects a response to the market. In any case, the time is propitious for an evaluation of the doctoral degree as the swelling numbers of its recipients have reached a peak and the future appears uncertain.

History of the Dissertation Review

The doctoral degree has been awarded by The University of Michigan since 1876. The last (and the first) faculty review of this program occurred in 1893. That committee report opened by stating that "it is not intended that the Doctor's degrees (sic) shall be won merely by faithful and industrious work for a prescribed time in some assigned course of study, and no definite term of required residence can be specified. As a rule, three years of graduate study will be necessary...." After prescribing regulations with respect to residency, application for candidacy, foreign language proficiency requirements, majors and minors, the report left the "method of examination, whether written or oral, ... to the discretion of the committee having the candidates in charge" and concluded with establishment of standards for the dissertation:

> The dissertation is of great importance. It must exhibit creditable literary workmanship and a good command of the resources of expression, but it must depend for acceptance more upon its subject-matter than upon its formal or rhetorical qualities. It must be an original contribution to scholarship or to scientific knowledge. The inquiry should be confined within narrow bounds. The treatment should be as concise as the nature of the matter permits and show familiarity with the history of the problems treated, with the literature bearing upon it, and with the latest methods of research applicable to it. Every dissertation should contain a clear introductory statement of what it is proposed to establish or to investigate and likewise a final resume of results. ... The preparation of an acceptable dissertation will usually require the greater part of one academic year.

Since the quaint 1890's almost 15,000 doctors of philosophy have emerged from The University of Michigan, half of them in the last decade. Much of the process of attaining the degree has remained essentially the same, much of it has become a great deal more complex. Although the degree continues to signify high achievement, Ph.D.s have become more commonplace in the general population and are found in many more occupations. To what extent have changing times and swelling numbers altered earlier purposes? How responsive or inflexible has the doctoral process been to changing demands upon it? What new directions for doctoral training can be identified? These are large questions, which cannot be readily answered in a single study document. Rather, the current Review Committee has chosen to focus on the most salient characteristic of the Ph.D. Degree, the dissertation.

In January of 1973 a steering committee was appointed by the Executive Board of the Graduate School to begin the process of dissertation review. The following objectives were set forth by this group:

> The overall objective of the Dissertation Evaluation Project is to bring the independent element of doctoral training before the graduate faculty for a penetrating reexamination and to synthesize the discussions in a report that can be consulted by the Executive Board of the Graduate School when considering changes in policy governing the dissertation process, the financial support strategies, and the modal designs of the dissertation itself. At a minimum, the faculty discussions should consider the following issues:
>
> 1. the fundamental purposes of the independent element of doctoral training as they relate to various groupings of disciplines and the extent to which these goals are being realized;
> 2. procedures in particular departments that have proved successful in research training and which could serve as models in the search for more effective training in other disciplines;
> 3. factual data on the financial and temporal costs of doctoral research, on financial support patterns, on the career destinations of Michigan Ph.D. graduates, on the later publication patterns of Michigan graduates, and on the status of our doctoral students;
> 4. the university-wide regulations pertaining to the dissertation together with recommendations for changes.[1]

In the fall of 1973 the committee was enlarged to its present membership and given the following charge by the Executive Board of the Graduate School:

> We are requesting the committee to review the dissertation requirement in the University's Ph.D. programs and to recommend changes which would strengthen the independent research and dissertation phase of doctoral training. We would in particular ask the committee:
>
> 1. To examine the dissertation phase as a learning experience, giving attention to the time required and the interaction of the dissertation student with the faculty in the selection, execution, and evaluation of the research project.

---

[1] Executive Board Document, 1972-73/24c, Report of the Committee on the Dissertation Requirement for the Ph.D. Degree, April 23, 1973.

2. To review the relationship between the dissertation phase and course work.
3. To consider the effectiveness of the dissertation phase as a component of training for non-academic careers, giving attention to alternative experiences which might be offered in some programs.
4. To recommend changes in the procedures by which the Graduate School administers the dissertation requirement so that these can be responsive to educational needs while maintaining scholarly excellence.[2]

Meeting regularly since that time, the Dissertation Review Committee elected to use a sample survey as the main instrument of its investigation. By inquiring directly from faculty, current candidates for the Ph.D. and alumni a mass of information could be obtained that related directly to the dissertation experience at The University of Michigan. The questionnaires, reproduced in Appendix B, requested both hard factual data and opinion responses to various elements of the doctoral program, but with emphasis on the independent research and dissertation phase. These questionnaires were mailed during the spring and early summer of 1974; processing and coding of returns took place in the fall; analysis of the results was begun in the winter of 1975, resulting in issue of the present report.

Sampling Method and Response Rates

The Rackham School of Graduate Studies confers a variety of doctoral degrees -- Doctor of Philosophy, Architecture, Arts, Education, and Musical Arts -- in every area of scholarly endeavor -- life science, physical science, social science and humanities. Within those broad divisions there are five professional doctorates that are administered within their respective colleges rather than from the Graduate School. These are the D.D.S., J.D., M.D., D.Ph., and D.P.H. Degrees. All of these professional schools, except Law and Dentistry, do offer Ph.D. programs through Rackham, however, and their faculties, candidates and alumni were included in the survey.

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[2] Memorandum to the Committee to Review the Dissertation Requirement from the Executive Board, dated November 28, 1973.

Faculty

Of the 2,285 faculty members in the Graduate School 761, or 33 percent, responded to the survey. One fifth of the faculty is located in clinical units, however, and for many of them the questionnaire was not relevant because they do not supervise doctoral students. When the 5 percent response from this group is subtracted from the total the overall faculty response rate rises to 41 percent. Since all of the clinical units are in the life science disciplines, the 25 clinicians who did respond were included with that division.

Table I-1 shows the distribution of the responding faculty by rank and division. Four of the five divisions are represented in roughly similar proportions, ranging from 18 percent in humanities to 29 percent in physical science. Education is very much smaller, constituting only 6 percent of the total. Education is actually a single discipline, however, that has been withdrawn from the social science division for purposes of this study because the tabulated survey results were sufficiently distinctive to warrant a separate classification.

TABLE I-1

Faculty by Rank and Division
(percent in each rank)

		Division				
Rank	Total	Life Sci	Phys Sci	Soc Sci	Human	Educ
Full Professor	58	51	60	60	55	64
Assoc. Professor	25	25	24	26	25	27
Assistant Professor	17	23	15	13	19	9
Other	1	2	1	1	1	0
N.	761	186	219	176	134	46
Percent of Total in Each Division		24	29	23	18	6

The distribution of faculty by rank is most uniform in the associate professor classification, which constitutes about one fourth of the total for all divisions. The largest differences are found in the assistant professor rank, which varies from 9 percent of the education faculty to 23 percent of life science. Conversely, life science includes the fewest full professors, 51 percent of the division, while education has the largest proportion, 64 percent, in this rank.

Although there is rough similarity in the sample proportions within ranks and among four of the divisions, the survey response rate by division and by rank within the divisions, is far more disparate, as shown in Table I-2 This results in a sample distribution which departs from the actual graduate school population. In order to calculate this response rate it was necessary to obtain a census by rank and division of all graduate faculty. Unfortunately, University records are not kept in precisely the form needed for this purpose, so that estimates had to be made by aggregating departmental data into division. Although these totals vary somewhat from the actual numbers of questionnaires distributed the differences are not of sufficient size to distort the proportional relationships.

The most serious problem arose in connection with the clinical units. They represent 69 percent of the total faculty in life science, making Division I the largest in the Graduate School, with 44 percent of the faculty members. But they produce very few Ph.D.s, so that the very low response rate from this group of faculty distorts the overall response rates for both the life science division and the total group far beyond an acceptable level. As the footnote to Table I-2 shows, when clinical units are included the response rate for Division I is only 17 percent, but when they are excluded that rate rises to 49 percent. Similar disparities show up at each rank. Accordingly, in the calculation of response rate for this table clinical units were omitted from the total faculty, and they were deducted from the responding life science faculty on a proata basis according to the distribution of ranks within the total faculty in clinical units.

About half of the faculty in three of the divisions -- life science, physical science and education -- responded to the questionnaire, with a slightly lower 44 percent responding from social science. Humanities faculty displayed the lowest overall response at 31 percent. There is

TABLE I-2

Faculty Response Rate by Rank and Division
(percent of total graduate faculty)

		Division				
Rank	Total*	Life Sci	Phys Sci	Soc Sci	Human	Educ
Full Professor	52	60	54	58	35	62
Associate Professor	51	62	57	45	39	63
Assistant Professor	36	41	12	33	29	27
All Ranks	43**	49	50	44	31	48

* Clinical units ommitted. With clinical units:

	Total	Life Science
Full Professor	43	29
Associate Professor	40	25
Assistant Professor	23	14
Total	31**	17

**These percentages differ by two points from those mentioned in the text on page 6 because they are derived from slightly differing data sets, a larger total faculty pool and a smaller number of responses by rank.

even greater variation within ranks, however, than within divisions. While about half of the full professors and associate professors responded, only 36 percent of all assistant professors returned the questionnaire. Their lower rate probably reflects the lower frequency of doctoral supervision by faculty in this rank. Among divisions the proportion of responding full professors ranged from 35 percent of those in humanities to 62 percent of those in education, a much greater differential than shows up in the total for all ranks. Similar variation occurs at the associate professor level, where 39 percent of humanities faculty responded and 63 percent of education. At the assistant professor level the variation ranges from only 12 percent of those in physical science to 41 percent of the life science faculty. One might tentatively infer from this response pattern that assistant professors are less likely to supervise doctoral students in the physical sciences than in any other division, and are more likely to do so in life science.

The divisional variations in response rate distort the sample as shown in Table I-3. Life science and physical science are over-represented in the sample at 22 percent and 30 percent, contrasted to 19 and 26 percent, respectively, in the graduate faculty as a whole. Humanities, on the other hand, is under-represented by its non-response, at 18 percent of the sample, contrasted to 26 percent in the graduate faculty. Social science and education appear in the sample in about the same proportions as in the total faculty.

Candidates

There were 2,259 individuals in active candidacy at the Graduate School in April 1974. Of these 1,975 (87 percent) had United States addresses on record. Questionnaires were mailed to all of them, and an effort was made to find better addresses for those which were returned by the post office. Nevertheless, 373 questionnaires remained undeliverable, reducing the total survey population to 1,602. That is 81 percent of the candidates to whom a mailing was sent initially, 71 percent of the total number of candidates in active status. Of these, 774 completed questionnaires were returned, for an overall response rate of 48 percent. The response rate by division is not available because the delivered questionnaires were not identifiable by that breakdown.

TABLE I-3

Divisional Representation in Faculty Sample*
(percent of total)

Division	Total Faculty	Faculty Sample
Life Science	19	22
Physical Science	26	30
Social Science	24	24
Humanities	26	18
Education	5	6

* Clinical units omitted.

Table I-4 shows that in this group of respondents social science is the largest division, represented by one third of the candidates, while education is the smallest with 12 percent. These proportions correspond quite closely with the distribution of candidates by division in the original survey pool, indicating that the candidates' non-response is not biased by division.

TABLE I-4

Distribution of Responding Candidates by Division
(percent in each division)

Division	Total
Life Science	15
Physical Science	19
Social Science	33
Humanities	21
Education	12

Alumni

Alumni were selected for the survey in sets of graduates receiving their doctoral degrees at five year intervals. Thus all names were pulled from the Rackham files of degree recipients in 1961-62, 1966-67 and 1971-72. These numbered 3,164, as shown in Table I-5. When culled for foreign and innacurate addresses about 600 names were dropped, reducing the total pool to 2,573, 81 percent of the original group. Questionnaires were mailed to all of these, with 212 envelopes returned as undeliverable, further reducing the survey pool to 2,361 or 92 percent of the questionnaires originally mailed. 1,263 alumni returned completed questionnaires for an overall response rate of 53 percent.

TABLE I-5

Alumni Response by Graduation Year
(number and percent in each year group)

	1962 or Earlier		1963-67		1968 & Since		Total	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Names on File at Rackham (1961-62, 1966-67 & 1971-72)	730	23	862	27	1572	50	3164	100
Questionnaires Mailed	522	20	756	29	1295	50	2573	100
Questionnaires Believed Delivered	484	20	700	30	1177	50	2361	100
Questionnaires Returned	245	20	354	28	654	52	1253*	100
Response Rate	51 %		50 %		56 %		53 %	

* Ten respondents failed to identify their graduation year

Although it was intended to limit the alumni survey to the three sets of years enumerated, several "errors" occured and responses were received from such extraneous years as 1924 and 1935 (one each) as well as adjacent years like 1970, from which 39 questionnaires were returned. Rather than eliminate some 101 otherwise valid responses from these unintended graduation years the categories were broadened to the designations "1962 and earlier", "1963-67", and "1968 and since". The response rates by these sets of years are shown in Table I-5: 51 percent for the 1962 and earlier period, 50 percent for 1963 - 67, and 56 percent for the most recent group of Ph.D. recipients. These differentials in response introduce a small degree of bias in favor of the most recent graduates, who make up 52 percent of the sample, but constitute only 50 percent of the total population surveyed. The 1963-67 group respresents 28 percent of the sample, understating slightly the 30 percent of questionnaires believed delivered, but slightly larger than the 27 percent of names in the Rackham files. Twenty percent of the sample received the degree in 1962 or earlier, the same proportion as represented in the number of questionnaires mailed and delivered, but down from the 23 percent of names on file as having received the degree in the 1961-62 period.

The response rate by division is not available for alumni because the original addresses were not identified that way, but the proportional distribution of response by division is shown in Table I-6. Among alumni physical science has the largest respresentation, at 28 percent of the total; life science is the smallest, with 14 percent. These divisional relationships vary somewhat over the years, however. For those graduating before 1963 over a third were in physical science and only 13 percent each in life science and education. The same relationship prevailed among

TABLE I-6

Division by Graduation Year of Alumni
(percent in each division)

		Graduation Year		
Division	All	1962 & Earlier	1963-67	1968 & Since
Life Science	14	13	14	14
Physical Science	28	34	33	23
Social Science	21	22	18	22
Humanities	20	17	21	21
Education	16	13	13	19

these three divisions during the mid 1960's, but social science and humanities changed places in relative number. For the most recent group of Ph.D.s the distribution has evened out at around a fifth each for four of the divisions; life science is considerably smaller at 14 percent. This represents a decrease in emphasis on physical science and a corresponding increase in humanities and education among the later graduates, but whether this reflects an actual shift in favored disciplines or a biased response among the alumni cannot be ascertained from the data. The distribution shown for candidates in Table I-4, tends partly to confirm the former explanation.

Method of Analysis

In drawing up the questionnaires the committee sought to place inquiries concerning the dissertation phase within the context of the Ph.D. program as a whole and to relate both to the subsequent career of recipients of the degree. Consequently, the questions group themselves into those relating to: personal characteristics of the respondent; purposes and goals of dissertation research and its relevance for subsequent careers; procedures by which the dissertation itself is produced and the direct costs incurred; relationships between doctoral students and faculty, especially during the dissertation phase; the number of years devoted to both the dissertation and the Ph.D.; satisfaction with these conditions, procedures and relationships; opinion about various practices and policies in the doctoral program as a whole, as well as how the dissertation phase relates to other aspects of the program. Most of the procedural and evaluative questions were asked of all three respondent groups -- faculty, candidates and alumni -- but much more detail was required from the two student groups concerning basic demographic characteristics, their personal experience as doctoral candidates and, in the case of alumni, their careers since receiving the degree. In effect, then, there were four surveys to be analyzed -- one for each respondent group and one common to all three.

The questions were couched in two kinds of format. The great majority offered discrete categories of response, such as total cost of dissertation research, or how many years a student should spend on his or her dissertation research; the respondent marked only one answer. Six of the opinion or evaluative questions, however, offered rating scales, which varied in length among questions, sometimes included a "no opinion" response and sometimes did not. Despite the difficulties posed by these rating scales, a uniform analytic technique was applied to all the questions in the survey.

The responses to each question were tabulated by academic division within respondent groups, and by respondent group for those questions that were asked of all three groups. For each of these two-way contingency tables the null hypothesis, that the values entered in the table did not differ from the values expected by chance at a one or five percent level of probability, was tested by the method of Chi-square. Two-way tables, with application of the Chi-square test, were also set up for several demographic characterisitics of students, such as sex, age, and marital status, on selected questions for which that kind of tabulation seemed appropriate. Finally, detailed cross-tabulations of the answers to many of the questions were similarly analyzed, in order to obtain a more detailed demographic profile, to relate opinion to experience, or to integrate opinions on several aspects of the doctoral program.

As the tabulations were more finely cut to display greater detail the number of responses in each "box" of a two-way table became progressively smaller. This number is reported in most tables, so that the reader may judge the validity of the analysis on the basis of sample size.

In addition to the multiple choice questions, which consistuted the bulk of the questionnaire, respondents were offered ample opportunity to elaborate or qualify their answers in narrative form. Half or more of the respondents took advantage of this opportunity. A large number of them, especially alumni and candidates, expended considerable effort on this commentary, and much of it was revealing and provocative. These essay responses are summarized in narrative form, using many quotations, to accompany the quantitative analysis.

Format of the Report

As indicated earlier, the questions in the survey grouped themselves around several topics. Each of these is analyzed successively in Chapters III to VIII, with a summary at the end of each chapter. Chapter II presents the conclusions drawn from the analyses and the recommendations of the

Dissertation Review Committee to the Graduate Faculty. Reproduction of the questionnaires and the highly detailed tables, primarily those which display responses by division, are presented in the appendices.

II

CONCLUSIONS AND RECOMMENDATIONS

The dissertation and graduation education of which it is an integral part appear to be in a healthy state at the University of Michigan.

In the absence of concrete information such as that obtained in the present survey, it is possible to hold either of two extreme views. At one extreme is the view that the dissertation is an archaic requirement for the Ph.D., that the focus is usually so narrow that the results are generally worthless, that the dissertation constitutes a frustrating hurdle which produces inordinate delay in the achievement of the doctorate, and that the dissertation is rarely relevant or necessary for the career requirements of those who achieve the doctorate. The other extreme view is that the dissertation has evolved with the temper of the time, that it constitutes training in thinking and problem solving skills, that for most it is the essence of graduate education, and that it constitutes essential preparation for a broad spectrum of subsequent careers. The Dissertation Review Committee at the outset expected to find many problems. It ended by finding very few. The dissertation appears to be in a continual state of evolution and adjustment, processes which are not evenly distributed among the disciplines and the great variety of doctoral programs in the University.

One way to approach a partial summary of the conclusions and recommendations of the study of the role of the dissertation in doctoral education at the University of Michigan is to attempt to address the list of matters suggested in the charge to the committee made by the Executive Board of the Horace Rackham School of Graduate Studies.

Purpose of the Dissertation. The purpose of the dissertation is the development of broad intellectual functions. Highest value is placed on learning to identify important problems, learning to organize and communicate scholarly research results, and to develop broad research skills and high level problem solving skills.

The non specific character of the objectives is well illustrated by the evaluation of the "contribution to knowledge" problem. The dissertation is seen as a demonstration of the capability of making future contributions to knowledge. That the dissertation itself be a contribution to knowledge is given a low value by most of the respondents.

Thus it would appear that those who criticize in terms of the narrowness of conception and possible triviality of the results are doing so on the basis of a misconception of the nature and role of the dissertation experience.

The Dissertation as a Learning Experience. A variety of issues were addressed related to the quality of the learning experience involved in the development and execution of a dissertation. A large majority of students select their own topics and there are few instances in which the dissertation is addressed to the advisor's interest and not to the student's. The majority believe that the scope of the dissertation is not too narrow or that research is emphasized at the expense of other professional skills. Most believe that the student's potential for creativity is developed, although a large proportion of the respondents believe that more could be done in this respect. There is a persistent will on the part of faculty and students alike to improve the quality of the dissertation. The search for high standards and improved quality pervades the replies received.

Time Required to Execute the Dissertation. That the dissertation takes too long to execute is heard frequently and persistently. The issues related to the length of the dissertation phase were explored in depth. The median length of a Ph.D. program is 4.3 elapsed years and 3.3 full time equivalent years. The dissertation phase involves from 37 percent to 55 percent the doctoral program, and it requires from 1.0 to 2.0 full time equivalent years, depending on the division within the University.

A number of factors are related to the duration of the doctoral program and the dissertation phase. The earlier the research is begun in the program, the smaller the number of elapsed years to complete the doctoral program. The difference is more than a year of elapsed time. Thus the practice of waiting until after candidacy has been achieved before beginning a dissertation adds substantially to the length of the program. It also leads to less emphasis on research with a smaller value for full time equivalent years on the dissertation reported by these students. Older students take a median of 5.5 elapsed years compared to 3.2 elapsed years by the youngest ones, but the greatest number of full time equivalent years is taken by those students in the middle range of our age distribution. Married students spend slightly less time on the dissertation. Students who enter with an M.A. degree in hand save .1 of a full time equivalent year. For all practical purposes, possession of an M.A. does not shorten the doctoral program.

By far the most important factor in delaying the completion of the doctoral program and the dissertation phase is the matter of employment. Those who report being employed quarter time during the writing of the dissertation report approximately 3.5 elapsed years in the doctoral program. As the fraction of employment increases, the reported number of elapsed years increases, and those who are employed full time report a median of 5.13 elapsed years. Excessive delay in completing the dissertation is often associated with the practice of leaving the University to take a full time job before the dissertation is completed. Some express the opinion that the practice should be prohibited.

Two thirds of the candidates and slightly less than half of the alumni feel that the dissertation takes too long. The longer the individual takes, the more likely he is to think that it takes too long, and there is a general tendency to indicate that it would have been better to have started the dissertation earlier than it actually was started.

Only one third of the faculty think the dissertation phase should be shortened, while 70 percent of the candidates think it should. On the other hand the candidates feel that there should be no limit on the amount of time taken to complete the dissertation, while the faculty thinks there should be such a limit although there is little agreement on what that limit should be.

Student-Faculty Interaction in the Dissertation Phase. General satisfaction was expressed concerning the quality of the interaction between the student, his doctoral chairman, and the committee. The selection of the chairman is reported as a joint decision, conflicts are rare, and the more interaction there is, the more satisfied everyone is.

The ideal patterns of interaction with the committee are "meetings at significant junctures" and meeting "once or twice but frequently with one or two members of the committee." Those who experienced less committee involvement are less satisfied. The ideal role for the cognate member is moderate involvement throughout the process. A substantial number feel that there might be involvement on the committee of non-University professionals. The majority are satisfied with both formal and informal interaction patterns, and among settings for interaction there is a very high value placed on the most informal of interactions, personal conversations.

When there is a problem, it usually involves either unclear expectations on the part of the faculty or insufficient time available to the student. A significant portion of this problem lies in the field of education where 15 percent of the faculty report being chairman of six or more dissertation committees whereas the typical number is two chairmanships per faculty member in the University. A substantial majority of all respondents feel that there should be some kind of regulation of the number of chairmanships a faculty member should hold at any one time.

Work load recognition for service on doctoral committees is also a substantial problem. Approximately 40 percent of the faculty report that they receive no recognition for committee service, either formal or informal. That more recognition is needed is apparent in the replies of a substantial majority of the faculty.

The Generality of Progressive Practices. Doctoral education at the University of Michigan consists of a very large number of programs with a wide variety of practices within this heterogeneous population. Few individuals have experience with more than one program and there is now no systematically maintained channel of communication through which the variety of practices can be communicated. Progressive practices which might well be considered on a broad front are these:

> In many programs, dissertation research or something like it is initiated very early in the doctoral program. This practice is associated with Ph.D. programs of normal length and greater satisfaction with the dissertation and the doctoral program.
>
> In some programs, a portion of the traditional dissertation, such as the scholarly review of the literature in experimental dissertations, is completed as early as the third year of graduate study and may or may not become a part of the bound dissertation. Both of these practices are in contrast with the practice in some programs of completing basic course work, attaining candidacy, and then beginning the development of a dissertation.
>
> There is one practice, pre-oral review of the dissertation, that characterizes a few programs and which probably should become as nearly universal as possible. In some programs the dissertation is reviewed by all committee members, either individually or in a group meeting, some weeks prior to the scheduling of the final oral. In this procedure committee members feel they have full freedom to make either positive or critical suggestions and require modification of the dissertation before the final oral. This practice amounts to a separation of the evaluative and ceremonial aspects of the final oral examination. Evaluation is carried out prior to the final step, and the final oral becomes, in essence, a ceremony and demonstration of intellectual accomplishment.
>
> Alternative formats, such as computer outputs, video tape, movies, varieties of public performances, group research, and demonstration projects were suggested as alternatives to the booklike dissertation.

Financial Factors in Dissertation Work. The average direct cost of a doctoral dissertation is inferred to be about $2,300, representing a range from virtually zero to more than $50,000. This mean value does not appear to have changed over the 15 year span of this study. Given inflation, it seems that less and less actual investment is being made in dissertation research.

There are large divisional differences. The average cost of a doctoral dissertation in the life sciences in about three times the average reported cost in the humanities. Federal financing of dissertation research is concentrated in the life and physical sciences, with a lesser frequency of such support in the social sciences. More than 70 percent of the dissertations in the humanities and in education are paid for out of the candidate's pocket. In general, the granting of support by departments and by the University follows the pattern of federal support, and there is no evidence that local funds have been used to counterbalance the influence of federal support or lack of it. The average cost of a federally supported dissertation is about four times the average cost of a personally supported dissertation.

It seems apparent from these data that the Ph.D. program and the dissertation phase could be materially shortened for many of those who take the longest time to complete the program by a period of subsidy which does not now exist. Subsidy for a year for those who would otherwise attempt to complete the dissertation in absentia while working full time, would significantly reduce the number of long delayed program completions.

Dissertation Publication. A healthy two thirds of the alumni report that their dissertations have been published as one or more journal articles, as a monograph, as a brief report or as a book. This is far more than the estimate of the faculty who appear to believe that only half of the dissertations are published. Slightly more than half of the respondents believe that additional measures are needed to increase the publication of dissertation research. On the other hand, a surprising one third of the alumni and candidates report that publication is not a specific objectives of the dissertation. It appears that two thirds regard it as an objective and virtually all publish their dissertations. The others appear to have no intention of publishing the dissertation. This would make it appear that lack of publication of the dissertation is a problem of the conception of the nature of the dissertation itself.

Integration of Dissertation Research Work and Courses. The most pressing problem which appeared in the results of the study involves the fee structure and the candidate regulations. The "candidacy" and "augmented candidacy" enrollment fee patterns and the restrictions on which courses a candidate may take is based on a false conception of the nature of doctoral education. It assumes that course work comes first and that the candidacy period should be devoted exclusively to work on the dissertation. Most doctoral programs regard the candidacy period as one in which involvement in advanced seminars is the essence of graduate education and the point at which the special qualities and virtues of a distinguished graduate institution become available to the candidate. The present fee structure has operated to reduce formal enrollment in advanced seminars to such a low level that most must be cancelled even though a large number of students wish to participate. If they are to participate formally under the present system, they must pay additional fees, and they must receive formal written approval from the Graduate School to enroll.

A desirable alternative would be a single fee for candidates and absolute freedom to enroll in any course which they think would add to their preparation for an intellectual career.

Relevance of Dissertation Research to Non-Academic Employment. The relevance of the dissertation research can only be evaluated in the light of very general objectives of the dissertation, indicated earlier, and the general objectives of students in seeking the Ph.D. The reasons given highest priority are to meet career objectives, to follow scholarly interests, to promote intellectual growth, and to contribute to knowledge. Economic motives are not frequently given high ratings by alumni or candidates.

In the light of these very general motives and objectives for the dissertation, it is not surprising that only 5 percent of the alumni and 6 percent of the candidates regard the dissertation as irrelevant. There is very little evidence that alumni employed in non-academic settings regard the dissertation as irrelevant. In only two groups of alumni does the frequency of "not relevant" evaluations exceed 10 percent. Of the small group employed in non-profit organizations and a small group of self employed, the irrelevant category is checked by 14 percent and 19 percent, respectively.

Careful and extensive examination of the data has led the Dissertation Review Committee to restate its faith in the Ph.D. and the dissertation. The Ph.D. is a research degree and should remain so. Every effort should be expended to improve the quality of the doctoral experience and the capabilities of those who receive the degree. The following recommendations are offered to this end.

Alternative Degrees

The committee strongly reaffirms its committment to a demonstrated ability to do advanced research as the *raison d'être* for the pursuit of the Ph.D.

Serious consideration should be given to providing alternative degree choices to the Ph.D. in certain disciplines.

Such degrees should be different from the Ph.D. with respect to the independent research component.

Such alternative degrees should encourage diversity of career preparation.

Admissions

The committee believes strongly that there should be a policy of free enterprise in choice of field and degree. There should be no restriction on the admission of highly qualified students. Steps should be taken, however, to inform applicants and students of potential career opportunities and limitations.

Fee Structure

Because of past practices, the integration of course work and dissertation research has been difficult. Regulations must be altered so that candidates may continue to enroll in advanced courses and seminars. The fee structure should allow for course work after candidacy without financial penalty.

Dissertation Committee Commitment and Credit

Dissertation committee chairmen and committee members must recognize an important commitment in time and effort when these positions are accepted. Students expect and are entitled to receive, in most instances, a great amount of supervision by the chairman and a lesser but substantial amount of assistance from other committee members throughout the dissertation process.

In recognition of this kind of service, departments should give formal credit to faculty for dissertation committee service.

Formality of Appointment to Committees

Appointment of committee members, especially that of the cognate member, should be formal enough to convey the importance of the function. The letter of appointment should contain a statement of the responsibilities of committee service as reflected in the regulations as they exist at the time of appointment by the Graduate School.

Dissertation Format

The committee recommends that means be found to inform candidates and chairmen that diversity in the form of the dissertation is possible. Dissertations of unusual format should be submitted with written justification from the dissertation committee to the Executive Board of the Graduate School for approval.

Early Initiation of Dissertation Research

Since respondents tended to be more satisfied with an early start on dissertation research, it is recommended that departments and programs encourage students to begin dissertation research as early in their graduate study as is consistent with department or program requirements.

Financial Support for the Terminal Phase of Dissertation Research

The financial necessity for full time employment of a candidate in a position unrelated to the dissertation and in an off-campus location often leads to a doctoral program of excessive length, sometimes causing dissatisfactions and even diluting the quality of the dissertation. Therefore, the committee recommends that the Executive Board direct its attention to the problem of financial support for worthy candidates in the terminal phase of the dissertation process. The committee has found that the availability of outside dissertation funding, and therefore the need for support, varies widely among the disciplines. However, if funds are to be made available for such aid no worthy candidate in any discipline should be excluded from consideration.

Dissertation Evaluation Prior to Final Oral

The candidate's committee should find some means, e.g., a pre-final oral examination, for early determination of whether additional or corrective work should be carried out or whether the candidate's work is satisfactory to the committee.

Communication of Innovative Doctoral Program Practices

The committee recommends strongly that some means be developed to communicate to the academic community at large innovative practices which emerge in individual doctoral programs.

III

WHO ARE UNIVERSITY OF MICHIGAN PH.D.S?

The typical doctoral degree recipient of the 1961-71 period was a male physical scientist (or social scientist in second place), in his late twenties, married, equally likely to have no, one or two children, working half time or more at a job supportive of his research, but also on some kind of fellowship. A woman receiving her Ph.D. in those years was most likely to be a humanist, in her thirties, equally likely to be married or unmarried, but if married either childless or with one child, working half time or more at a job more or less supportive of her dissertation research, and supported by her own or her spouse's earnings. The candidates of 1974 differ from the alumni in some important respects. Although still typically male, considerably more of them are female. Of either sex they are most likely to be social scientists, in their late twenties, married, childless (especially if female), or with one child, self-supporting through a full time job that is not directly supportive of dissertation research.

After completing the doctoral degree alumni typically follow academic careers, mostly as teachers at Ph.D. granting universities. The physical scientists are as likely to be in industrial applied research, however, and the educators, especially the men, are as likely to be in administration. Candidates anticipate career patterns that are about the same as the alumni, except that the current graduates in life, physical and social sciences expect to be more heavily engaged in research and less in teaching. Women candidates expect considerably more equivalency with men in employment characteristics than their alumni colleagues have experienced.

These thumbnail sketches of a typical alumnus or candidate illustrate merely the central tendencies of a great variety of demographic and economic characteristics. In this chapter the array of those individual characteristics will be presented and discussed, both singly and in significant relationship to one another. Differences among graduate students are as important as likenesses, for it is the variety of their personal characteristics and career experiences that explains many of their attitudes toward and observations about the dissertation process.

Demographic Characteristics of the Sample

Alumni

The 1263 alumni who returned the survey questionnaire are distributed by division, sex and graduation year as shown in Table III-1. Physical science is the largest division, while life science and education almost tie for the smallest. But the proportion of degree recipients in physical science declined over the three graduation year periods, while those in humanities and education increased slightly and life science and social science remained fairly stable. Women are distributed quite differently among the divisions than men in that their numbers are negligible in physical science, largest in humanities and of roughly similar proportions in the other three divisions. Only in social science are men and women found in fairly equal proportions, while in life science and education there are slightly higher proportions of women, and in humanities relatively twice as many women as men obtained the Ph.D. during the sample years.

TABLE III-1

Alumni by Division, Sex and Graduation Year
(percent in each division)

				Graduation Year					
	Total			1962 & Earlier		1963-67		1968 & Since	
	All	Male	Female	Male	Female*	Male	Female	Male	Female
Life Science	14	13	18	13	16	13	22	13	16
Physical Science	28	32	7	37	8	37	9	27	7
Social Science	21	21	21	22	24	18	19	23	21
Humanities	20	17	13	14	32	19	28	17	36
Education	16	15	20	13	16	12	22	19	20

*Column does not add to 100 because 4 percent miscoded.

These distributions by sex among the divisions do not reveal, however, the relative numbers of men and women within each division. That distribution (Table III-2) displays quite a different pattern. Overall, only 17 percent of all the alumni responding are women, representing a low of 4 percent in physical science and a high of 28 percent in humanities. Thus humanities is not only the most important division among alumnae, it is the one that has traditionally had the largest representation of women. In all divisions, however, the relative numbers of female Ph.D.s has increased over the three graduation periods while in the whole group of alumni it almost doubled. Female representation has increased most in the traditional disciplines of humanities, although the relative increase in life science is almost as large.

TABLE III-2

Sex of Alumni by Division and Graduation Year
(percent of each sex)

			Graduation Year					
	All		1962 and Earlier		1963-67		1968 and Since	
	Male	Female	Male	Female	Male	Female	Male	Female
Total	83	17	89	11	84	16	80	20
Life Science	78	22	88	12	75	25	77	23
Physical Science	96	4	98	2	96	4	95	5
Social Science	83	17	88	12	84	16	82	18
Humanities	72	28	78	22	79	21	65	35
Education	79	21	87	13	73	27	79	21

Almost half of all alumni were between 26 and 30 years of age when they received the Ph.D. Degree, but a fourth were 36 or older (Table III-3). Physical scientists were the youngest graduates, with 59 percent obtaining the degree between ages 26-30. Educators represented the oldest group, 56 percent of whom were over 36 when they attained the degree. Overall the women tended to be older than the men when they received the degree, especially in education and humanities, the two oldest divisions for both sexes. Among life scientists, the second youngest division, on the other hand, the women tended to be slightly younger than the men. The picture in social sciences is mixed, but on balance the women appear to be slightly older.

III - 4

Age of Alumni when Received the Degree

(percent in each age group)

	N.	25 or Under	26-27	28-30	31-32	33-35	36 and Over
		Age Group					
Total							
All	1199	5	19	26	14	12	24
Male	996	6	20	27	14	12	22
Female	203	4	15	24	12	10	35
Life Science							
All	166	7	22	28	15	12	16
Male	130	6	20	27	15	15	17
Female	36	11	31	31	14	3	11
Physical Science							
All	338	8	26	33	16	8	9
Male	323	8	25	34	16	8	9
Female	15	7	40	20	20	0	13
Social Science							
All	259	5	24	29	13	12	16
Male	216	5	26	29	13	11	17
Female	43	7	16	33	12	19	14
Humanities							
All	239	3	13	22	15	15	32
Male	171	4	15	21	17	17	26
Female	68	2	7	23	12	10	46
Education							
All	197	2	4	15	9	14	56
Male	156	3	4	16	9	15	54
Female	41	0	5	12	7	10	66

Statistically there is no significant difference in the age distribution of alumni over the three sets of graduation years. But, in all of the divisions except humanities the porportion of alumni receiving their degrees at ages 28-30 increased over the period (in humanities it was the 26-27 year old group that showed this increase), while the oldest age group declined in relative numbers in all the divisions except physical science. (See Appendix Table III-1) Thus, it might be suggested that Ph.D. recipients were tending slightly to be younger in the later years than in the earlier ones. In a very general way this suggestion is supported by the data for candidates (Table III-15 below), which show either the same porportions in those age groups as for the most recent alumni, or a continuation of such trend as is discernible.

Over three fourths of the alumni were married when they received the Ph.D., the men considerably more likely to be so than the women (Table III-4). Life science was the "most married" division, with 88 percent of the male Ph.D.s married, although only 53 percent of the women fell into that category.

TABLE III-4

Marital Status of Alumni by Sex
(percent in each status)

		Division				
	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
All						
Married	77	80	81	75	73	77
Not Married	21	19	18	21	24	20
Other	2	1	1	4	3	3
Male						
Married	82	88	81	79	81	88
Not Married	16	12	18	18	18	8
Other	2	0	1	3	2	3
Female						
Married	50	53	73	54	53	32
Not Married	46	44	27	39	41	66
Other	4	3	0	7	6	2

The same relationship prevailed in social science and humanities. There were too few women in physical science for meaningful comparisons, but in education the differences were most extreme; 88 percent of the men were married contrasted to only 32 percent of the women. Marital status of alumni does not appear to be a function of age, as there is little difference in the proportion of married men between the youngest and oldest divisions, and among women the smallest porportion of married alumnae occurs in the oldest division. Very little change in marital status took place over the three graduation year periods, either in the total group of alumni or in four of the divisions. But in education the proportion of married alumni dropped from 94 percent in the pre-1963 period to 65 percent in the mid-1960's, then rose again to 77 percent since

1968.

Slightly under a third of the married alumni were childless when they received the degree, and about half of them had one or two children (Table III-5). These proportions prevailed for four of the divisions. In education, however, family sizes were almost reversed. Although almost half of this group as well had one or two children, 39 percent had more than two and only 15 percent had none. Generally, throughout the divisions married female alumni were less likely to have children than males were. This differential was especially marked in education where the ratio among the childless was two to one. Among married women who did have children they were likely to have smaller families than the married men with children.

TABLE III-5

Number of Children of Married Alumni by Sex

(percent with each number)

		Division				
	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
All						
None	30	31	34	33	33	15
One	25	31	23	27	26	17
Two	26	22	28	28	23	29
More than two	19	16	15	12	18	39
N.	963	134	278	204	181	157
Male						
None	28	28	34	32	32	14
One	24	29	22	24	25	18
Two	28	25	29	31	23	27
More than two	20	18	15	13	20	41
N.	851	114	267	177	141	143
Female						
None	37	45	36	41	35	29
One	34	40	45	44	30	7
Two	17	5	0	7	25	43
More than two	12	10	18	7	10	21
N.	112	20	11	27	40	14

A little over a third of the alumni supported themselves primarily by their own earnings, about a fourth were on straight fellowship or scholarship, and another fourth had either a teaching fellowship or research assistantship (Table III-6). Only social science among the divisions conformed to this pattern, however. In the life sciences half the students were on straight fellowships, while in physical science almost a third were supported by straight fellowship and an equal 30 percent by research assistantships. Personal earnings and teaching fellowships were of little importance in these two division and physical science was the only division in which research assistantships were of

TABLE III-6

Personal Support of Alumni by Sex

(percent using each source)

Source of Support	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
		Division				
All						
Pers. earngs.	36	17	20	35	44	67
Spouse earngs.	10	9	6	12	19	7
Flshp./schlsp.	27	50	30	29	15	14
Teach. flshp.	12	15	12	9	20	6
Res. asst.	13	6	30	14	1	4
Loans & parents	2	3	2	1	1	3
N.	1065	143	291	232	213	177
Male						
Pers. earngs.	35	18	21	32	46	69
Spouse earngs.	10	11	6	10	16	7
Flshp./schlsp.	27	49	29	33	14	12
Teach. flshp.	12	11	13	10	20	6
Res. asst.	15	8	30	14	1	4
Loans & parents	2	4	1	1	3	3
N.	883	113	277	194	153	138
Female						
Pers. earngs.	40	17	7	47	40	62
Spouse earngs.	15	3	7	21	25	5
Flshp./schlsp.	24	53	36	10	17	20
Teach. flshp.	13	27	7	5	18	5
Res. asst.	7	0	36	11	0	8
Loans & parents	1	0	7	6	0	0
N.	182	30	14	38	60	39

major importance. Teaching fellowships were of greatest importance in the humanities, supporting a fifth of those alumni, while almost half of them supported themselves by earnings. In education over two thirds of the alumni were self-supporting. In no division was spouse's earnings very important, although that source reached its highest level in humanities.

Women tended to be slightly more self-supporting than men in social science, but in the other divisions they supported themselves to a slightly lesser extent than men did. In social science and humanities relatively more of them than men were supported by spouse's earnings. Additional evidence from candidates makes it apparent that women are not putting their husbands through graduate school to the extent they once did; more often the contrary. Relatively more women than men received straight fellowships in all divisions except social science, where only half to a third as many women as men had fellowship support of any kind. And, relatively, more than twice as many women as men in life science were supported by teaching fellowships.

For alumni as a whole the sources of their personal support remained remarkably stable over the three graduation year periods (Table III-7).

TABLE III-7

Personal Support of Alumni by Graduation Year

(percent using each source)

		Source of Support					
	N.	Pers. earngs.	Spouse earngs.	Flshp./ Schlsp.	Teach. Flshp.	Res. Asst.	Loans & Parents
Before 1963	205	36	11	26	12	13	2
1963-67	312	36	6	25	15	16	2
1968 and since	578	36	14	26	11	11	2

In most of the divisions the mid-sixties saw some shifting around among sources, but there are very few trend-like changes. (See Appendix Table III-3). There is a statistically significant difference in the source of personal support between married and non-married alumni, however, as shown in Table III-8. Half of the married alumni relied upon independent earnings of self and spouse, mostly self, while less than a third of the non-married depended upon personal earnings. Conversely, about two thirds of the non-

TABLE III-8

Personal Support of Alumni by Marital Status*

(percent using each source)

Marital Status	N.	Source of Support					
		Pers. Erngs.	Spouse Erngs.	Flshp./ Schlshp.	Teach. Flshp.	Res. Asst.	Loans & Parents
Total							
Married	843	36	14	25	12	12	1
Non Married	228	31	0	33	14	18	4
Life Science							
Married	118	18	13	47	14	6	2
Non Married	29	17	3	55	14	7	3
Physical Science							
Married	245	21	9	30	13	27	0
Non Married	54	9	0	28	13	44	6
Social Science							
Married	176	36	15	27	9	13	0
Non Married	51	27	0	43	8	18	4
Humanities							
Married	163	44	25	12	16	2	2
Non Married	53	43	0	23	30	0	4
Education							
Married	135	70	9	10	6	3	2
Non Married	28	58	0	21	5	11	5

*Actual values differ significantly from expected values at .01 level on chi-square test.

married were supported by fellowships or teaching or research assistantships contrasted with half of the married students. The biggest difference occured in the straight fellowship support, one third of the non-married contrasted to one fourth of the married.

This order of contrast prevailed throughout the divisions. It is most marked in humanities,where 69 percent of the married students were supported by themselves or their spouses,while only 43 percent of the non-married supported themselves,but almost twice as many non-married as married students were supported by fellowship aid. Life science showed the least contrast. (The resourceful unmarried life scientist, who managed to support him/herself by spouse's earnings was not identified.)

The source of alumni personal support was also significantly associated with age. As Table III-9 shows, the proportion of students dependent upon personal earnings rose steadily with age at which the degree was attained,

TABLE III-9

Personal Support of Alumni by Age
(percent in each age group)

Source of Support	Age Group* 25 or Under	26-27	28-30	31-32	33-35	36 and Older
Personal Earn.	12	13	24	32	48	66
Spouse Earn.	4	11	13	13	10	9
Felshp. or Schrshp.	55	39	26	29	19	13
Teach. Felshp.	16	17	17	7	7	8
Res. Asst.	11	19	18	14	15	4
Loans & Parental Supt.	2	1	2	5	1	1
N.	56	198	293	151	134	267

*Actual values differ significantly from expected values at .01 level on chi-square test.

from 12 percent of those 25 or younger to 66 percent of those 36 or older. Conversely, straight fellowship aid declined over the age span from 55 percent of the youngest group to 13 percent of the oldest; teaching fellowships show a similar but less extreme pattern. Research assistantships, on the other hand, represent a fairly consistent 11-19 percent of all the age groups up to 36, but only 4 percent of those 36 or older had such assistantships.

These differences show up in all the divisions, but the progressions are not always as clear as for the total (See Appendix Table III-4). In life science dependence upon personal earnings does not become important until age 33-35, while straight fellowships or scholarships occur in comparable proportions in all age groups to 33. The situation is similar in physical science. Social science corresponds most closely to the pattern for the total, while in humanities there is a sudden drop in the proportion with straight fellowships above age 25 and in teaching fellowships at age 31-32. Most of the education alumni of all ages were self-supporting. The distribution of the three types of financial aid by age, marital status and sex, shown in Appendix Table III-5, supports the finding that such assistance tended in a general way to go disproportionately to younger students (although the pattern is not consistent), to unmarried students, especially in social science, humanities and education, to men in social science and to women in the other divisions.

Most alumni, 83 percent, worked while writing the dissertation. This proportion was quite similar for both sexes and among all divisions, except life science where only two-thirds were employed. Of those with jobs, 40 percent worked full time and the remainder were about evenly distributed between one quarter time and half to three quarters time (Table III-10).

TABLE III-10

Extent of Alumni Employment While Writing the Dissertation

(percent at each level)

		Division				
	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
All						
One fourth time	29	41	33	26	30	19
Half to 3/4 time	31	26	41	32	27	24
Full time	40	34	26	42	43	57
Percent of All	83	65	83	88	85	89
Male						
One fourth time	28	41	32	26	27	18
Half to 3/4 time	31	23	41	29	26	24
Full time	41	36	27	45	47	58
Percent of All	87	65	87	91	91	94
Female						
One fourth time	34	41	55	29	37	20
Half to 3/4 time	32	33	36	45	27	23
Full time	34	26	9	26	36	57
Percent of All	84	75	73	88	87	85
Married						
One fourth time	28	41	35	23	29	15
Half to 3/4 time	30	22	27	32	26	25
Full time	42	37	28	45	45	59
Percent of All	87	70	87	91	89	93
Not Married						
One fourth time	33	35	29	35	34	29
Half to 3/4 time	35	40	57	29	30	20
Full time	32	25	14	36	36	51
Percent of All	83	62	80	93	90	88

There was considerable variation over the divisions, from one fourth of the employed physical science students who worked full time to 56 percent of the educators. Women were much less likely to work full time than men in all the divisions, except education where they were about even. Not unexpectedly, alumni who were married when they received the degree were more likely to be working full time than those who were not. Nowhere are the differences in employment pattern between married and non-married students very large, except among physical scientists working full time, where twice as many married students as unmarried did so, and among education students working one quarter time, where there were twice as many nonmarried students in the category.

When the degree was attained did not make a significant difference in how much working time alumni put in while writing the dissertation (Table III-11). The proportion working full time did decline somewhat over the period, however, in all divisions. This was most marked in education, where it went from 76 percent to 54 percent. (Appendix Table III-6) By the same token, the proportion of students putting in one quarter working time rose over the years, especially in social science and education. The half to three quarter time people maintained a fairly steady proportion, although there tended to be more of these during the middle sixties than before or after. To the extent that candidates may be considered a contemporary extension of alumni in their characteristics, it would appear that full time employment is back up again (compare Table III-21).

TABLE III-11

Amount of Alumni Employment by Graduation Year
(percent at each level)

	Graduation Year		
	1962 & earlier	1963-67	1968 & since
Quarter time	25	26	32
Half to 3/4 time	30	35	30
Full Time	45	39	38
N.	211	308	554

Most of the alumni who were employed while writing the dissertation held jobs that were directly or indirectly supportive of their research (Table III-12). But there was a very wide range among divisions in the proportion that held directly supportive jobs, from 22 percent in humanities

TABLE III-12

Relation of Alumni Employment to Dissertation Research

(percent in each relationship)

Degree of Support	Total	Division* Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
None	25	22	17	26	35	25
Very indirect	32	33	27	30	44	28
Directly supportive	43	44	56	44	22	47
N.	946	99	237	218	204	179

*Actual values differ significantly from expected values at .01 level on chi-square test.

to 56 percent in physical science. There was no significant difference between men and women in this regard, but the year of graduation did make a difference. A higher proportion of the jobs were directly supportive of dissertation research in all divisions except humanities during the middle 1960's than in the earlier or later periods.

Candidates

The 774 candidates who responded to the survey were distributed by division and sex as shown in Table III-13. Whereas among alumni physical science is the largest division, the most important division for candidates is social science. The decline in physical science continues a shift displayed by the latest group of alumni, but the prominance of social scientists among candidates appears to be a more recent phenomenon (compare Table III-1). Education is the smallest division among candidates, as it was for alumni, but a late 1960's increase in its importance has been reversed by a more recent drop in the proportion of candidates in this field. Life science, on the other hand, which remained quite stable

TABLE III-13

Candidates by Division and Sex

(percent in each division)

Division	All	Male	Female
Life science	15	18	10
Physical science	19	24	5
Social science	33	31	37
Humanities	21	17	34
Education	12	10	14

over the three alumni graduation year periods, shows a recent increase in proportionate share, while humanities remains stable.

Only in social science and education are there similar proportions of men and women candidates. Life and physical science are far more important among males than among females, accounting for a fifth to a fourth of the group in the one case and only 5 to 10 percent in the other. Conversely, twice as many women as men are candidates in humanities. This distribution by sex also represents some major departures from the alumni pattern. Humanities is superseded by social science in its importance for women, while relatively fewer female candidates are life scientists than were their older colleagues.

Even though social science is the most important division among women they represent less than a third of the candidates in those disciplines, as they do in education (Table III-14). Only in humanities is there anything approaching an even distribution between the sexes. In the physical sciences women are still almost non-existent and they constitute only 17 percent of the life sciences, despite inclusion of the School of Nursing in that division. Although the proportions of

TABLE III-14

Sex of Candidates by Division

(percent of each sex)

		Division				
	Total	Life Sci	Phys. Sci	Soc. Sci	Human.	Educ.
Male	73	83	93	70	58	67
Female	27	17	7	30	42	33

women have increased substantially in social science, humanities and education since the latest alumni year reported, in life science their representation is smaller than it was. (Compare Table III-2)

The age distribution of male and female candidates (Table III-15) is roughly similar with the major exception of the oldest age group, which is represented by 28 percent of the women but only 18 percent of

TABLE III-15

Candidates' Age by Sex
(percent in each age group)

		Age Group					
Total	N.	25 or Under	26-27	28-30	31-32	33-35	36 and Over
All	745	6	19	29	15	11	20
Male	550	6	18	30	16	12	18
Female	195	6	19	27	11	10	28
Life Science							
All	116	12	31	29	10	12	7
Male	97	13	26	32	8	12	8
Female	19	10	37	26	11	11	5
Physical Science							
All	139	9	24	36	17	7	7
Male	129	9	23	36	18	8	6
Female	10	10	30	50	0	0	10
Social Science							
All	242	7	19	36	15	10	14
Male	170	5	16	35	18	13	13
Female	72	10	22	36	12	3	17
Humanities							
All	167	2	17	17	19	16	28
Male	91	2	15	19	20	18	26
Female	66	2	15	21	15	14	33
Education							
All	85	0	2	15	11	13	59
Male	58	0	2	17	14	10	57
Female	27	0	4	7	4	22	63

the men. This disparity is accounted for largely by humanities, where a third of the women are 36 or older, and education, where almost two thirds of them are that old. Another fifth of the female education candidates are 33-35, twice as large a group as the men in this category. Nevertheless, the largest concentrations of male candidates in both humanities and education are also in the oldest age group. Life science is the youngest division for both sexes, but proportionately more women of 27 and under are found in that division and social science than are men in those age groups. In short, in life and social science the women tend to be younger than the men, while in humanities and education they tend to be older.

Over two thirds of the candidates are married, but the men are married to a far greater extent than the women (Table III-16). Although

TABLE III-16

Marital Status of Candidates by Sex

(percent in each status)

		Division				
	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
All						
Married	70	66	75	68	65	81
Not married	27	30	24	29	32	15
Other	3	4	1	3	4	4
Male						
Married	75	70	76	73	69	97
Not married	23	26	24	25	26	2
Other	2	4	0	2	4	2
Female						
Married	57	45	60	60	58	50
Not married	38	50	30	35	39	43
Other	5	5	10	5	3	7

the low proportion of married women in life science is what one might expect from this youngest division, only half of the women in the oldest division, education, are married. Social science and humanities, on the other hand, show contradictory patterns in that they have about the same proportions of married women, yet the female social scientists are considerably younger than the women in humanities. Furthermore, the candidate marital pattern is quite different from the alumni (compare Table III-4). Relatively fewer male candidates are married than male alumni were, in all divisions. This may be explained by the inclusion among candidates of beginners who will, in fact, be married by the time they receive the degree. But the marriage rate among female candidates is already considerably higher than it was among female alumni at graduation, in all divisions. There are interesting divisional shifts as well. Whereas life science was the most married division among alumni, it has the smallest proportion of married candidates. And the women in education are married to a far greater degree than their older colleagues, to the extent that it is no longer the least married division for them.

Size of family does not differ between the sexes as much as marital status does, although the men are more likely to have children than the women are, in all divisions (Table III-17). Married candidates in life

TABLE III-17

Number of Children of Married Candidates

(percent with each number)

		Division				
	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
All						
None	40	52	51	38	34	24
One	24	19	24	28	28	14
Two	19	16	13	19	23	24
More than two	17	12	11	14	15	37
N.	521	77	105	167	99	70
Male						
None	38	50	49	36	26	21
One	24	21	25	28	26	14
Two	20	15	13	21	31	23
More than two	18	13	12	15	19	41
N.	411	68	99	124	62	56
Female						
None	50	67	83	49	49	36
One	24	11	0	28	32	14
Two	15	22	17	12	11	29
More than two	11	0	0	12	8	21
N.	110	9	6	43	37	14

and physical sciences are much more likely to be childless than those in the other three divisions. There is not much variation among the first four divisions in the proportions of candidates who have one child, but only 14 percent of the education candidates fall into this category. They, on the other hand, are far more likely than the others to have more than two children. Comparison with alumni (Table III-5) shows that substantially more married candidates are childless and those with children tend to have fewer. But these data include beginning candidates who may have increased family size by the time they complete the degree.

Over 60 percent of the candidates are financing their education by personal earnings of their own or their spouse's, while a little over a third have fellowships of one kind or another (Table III-18). Overall, women are financed by fellowships to the same extent as men, but substantially fewer of the women support themselves through personal earnings and relatively more of them are supported by their spouses. This pattern of personal financing appears to represent some important departures from the experience of alumni (compare Table III-6). No firm conclusions can be drawn because

TABLE III-18

Personal Support of Candidates by Sex

(percent using each source)

	Total	Division				
		Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
All						
Pers. earngs.	44	28	25	52	44	75
Spouse earngs.	17	11	17	17	21	16
Flshp./schlshp.	25	44	36	22	18	8
Teach. flshp.	11	16	19	6	13	0
Loans & parents	3	2	3	3	5	1
N.	664	101	126	218	142	77
Male						
Pers. earngs.	47	29	26	57	52	85
Spouse earngs.	14	12	16	14	11	11
Flshp./schlshp.	25	42	36	17	20	4
Teach. flshp.	11	15	18	8	8	0
Loans & parents	4	2	4	4	9	0
N.	487	82	116	154	82	53
Female						
Pers. earngs.	36	21	10	40	32	54
Spouse earngs.	26	5	30	24	35	25
Flshp./schlshp.	27	53	30	33	15	17
Teach. flshp.	11	21	30	2	18	0
Loans & parents	2	0	0	2	0	4
N.	176	19	10	63	60	24

alumni were offered an additional category of financial aid on the questionnaires, research assistantship, which candidates may have subsumed under personal earnings. This seems to make a difference mainly in physical science, however, because when research assistantships are added to personal earnings for alumni the results do not differ greatly from candidates' reports of personal earnings in the other divisions. It may be inferred then, with caution, that among the older Ph.D.s a larger proportion received fellowship aid of all kinds. Women, however, were more dependent on personal earnings than they are now. Thus the increased self support of candidates is primarily a male experience.

Divisional variation in candidate support is of the same kind as for alumni. In the life and physical sciences only a fourth or slightly more finance themselves through personal earnings, while well over half are on fellowships. At the other extreme 75 percent of the education candidates support themselves through personal earnings, only a small 8 percent have straight fellowships and none have teaching fellowships. Social scientists fall between, with almost twice as many supporting themselves as receive fellowships. Humanists divide more evenly between personal earnings and fellowships, and there are more teaching fellowships in humanities than in social science.

In every division substantially fewer women than men support themselves from personal earnings. On the other hand, almost two to three times as many women as men are supported by their spouse's earnings in every division, except life science. Women are generally more likely than men to be on fellowships of all kinds. Only in humanities are relatively more male candidates than female on straight fellowship and in the case of teaching fellowships relatively more men than women have them only in social science.

Unlike the alumni (although the discrepancy in response categories must be remembered), marital status appears to make little or no difference with respect to whether a candidate supports himself or herself by personal earnings (Table III-19). Although two to three times as many candidates are married as are not, about the same 43-45 percent of them are supported by personal earnings, and this equivalency prevails throughout the divisions. (See Appendix Table III-7) Obviously only those who are married are

TABLE III-19

Personal Support of Candidates by Marital Status
(percent using each source)

		Source of Support				
Marital Status *	N.	Personal Earnings	Spouse's Earnings	Fellowship	Teaching Fellowship	Loans Parents
Married	463	45	24	21	8	1
Not Married	186	43	0	35	16	7

*"Other" ommitted because there are only 20 cases.

supported by spouse's earnings, but in every division the proportion so supported is far smaller than the overall proportion of married candidates. On the other hand, fellowships of all kinds are much more supportive of unmarried than married candidates in every division, ranging from 18 percent of the unmarried educators to 75 percent of the unmarried life scientists.

Table III-20 shows the source of personal support by age group. Over two thirds of the youngest candidates are on straight fellowships or scholarships, but the proportion declines abruptly and steadily with age to only 9 percent of those 36 and older. The pattern is similar for teaching fellowships. Conversely, very few of the youngest candidates support themselves through personal earnings, but this proportion rises equally sharply with age to almost three fourths of those 36 and older.

TABLE III-20

Personal Support of Candidates by Age
(percent in each age group)

	Age Group					
Source of Support	25 and Under	26-27	28-30	31-32	33-35	36 and Older
Personal Earnings	10	22	37	55	56	72
Spouse's Earnings	5	19	19	15	25	12
Fellowship	68	38	26	20	13	9
Teaching Fellowship	15	17	14	5	4	4
Loans and parents	2	4	4	5	1	2
N.	40	116	204	96	75	130

The importance of a spouse's support varies little over the age groups, with the largest proportion in this category, 25 percent, found at 33-35 years. The clearly defined relationship between age and support from fellowships on the one hand and personal earnings on the other prevails consistently through all the divisions except education, where almost everybody supports himself or is helped by a spouse (see Appendix Table III-8).

When the age, sex and marital status distributions are tabulated for fellowship and teaching fellowship recipients the advantage of youth emerges clearly for all divisions, although age discrimination is least marked in social science (see Appendix Table III-9). When compared to alumni the age factor is more important for candidates in receiving financial aid, while apparent discrimination in favor of the unmarried remains about the same. But the greater likelihood for men to have fellowships in social science has been altered considerably among candidates. Presently a disproportionate number of women in social science are receiving straight fellowships, although the teaching fellowships continue to go almost entirely to men. Women continue to be favored in life science and humanities.

Most candidates, of both sexes and in all divisions, are employed while writing the dissertation, almost half of the total group at full time (Table III-21). The proportion of students working full time is higher among candidates of both sexes in all divisions than it was for alumni. Considerably more of the male candidates, proportionately, work full time than the women do, however, in all divisions; conversely more of the women work one quarter time. But the proportions working half to three quarters time are about equal for both men and women. This pattern of difference between the sexes prevails throughout the divisions, but, as for the alumni, there are some important divisional differences in how much time candidates of either sex spend in employment. Physical scientists are least likely to be employed full time, at about a third their number, while educators are most heavily employed with 70 percent working full time. One might expect married candidates, like the alumni, to work full time to a much greater extent than unmarried candidates. This is the case only for life

TABLE III-21

Extent of Candidates' Current Employment by Sex and Marital Status

(percent at each employment level)

	Total	Division				
		Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
All						
Quarter time	24	31	29	24	23	15
Half to 3/4 time	28	24	40	28	25	15
Full time	48	45	31	48	53	70
Percent of All	100	66	84	81	83	90
Male						
Quarter time	21	26	28	19	16	11
Half to 3/4 time	28	23	29	30	23	12
Full time	51	51	33	51	61	77
Percent of All	85	67	89	89	87	97
Female						
Quarter time	35	54	43	36	32	25
Half to 3/4 time	27	31	57	24	28	21
Full time	39	15	0	40	40	54
Percent of All	76	65	70	74	79	86
Married						
Quarter time	23	33	28	23	19	14
Half to 3/4 time	25	17	35	27	27	14
Full time	52	50	37	50	54	73
Percent of All	83	70	90	83	81	94
Not Married						
Quarter time	27	26	30	28	27	17
Half to 3/4 time	31	39	56	30	22	8
Full time	41	35	15	43	51	75
Percent of All	82	66	79	86	90	86

and physical scientists, however. There is little difference among social scientists,and in humanities and education almost identical proportions of married and unmarried candidates work full time.

Candidates divide fairly evenly among those whose work is directly supportive of the dissertation research, avery indirectly related and not related at all (Table III-22). In general candidates employment is less relevant to the dissertation than alumni jobs were for all divisions, but the disparity among divisions is not currently as large. (Compare Table III-12)

TABLE III-22

Relation of Candidates' Employment to Dissertation Research

(percent in each relationship)

Degree of Support	Total	Division* Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
None	30	32	24	33	28	26
Very indirect	34	19	19	39	43	39
Directly Supportive	36	49	57	28	29	35

*Actual values differ significantly from expected values at .01 level on chi-square test.

Physical science remains the division in which the largest proportion of jobs are directly supportive, while humanities and social science almost tie for last place in that category. And, like the alumni, there is little difference in the experience of male and female candidates.

Employment Experience of Alumni

Two thirds of Michigan doctoral alumni pursue careers in higher education, more than half of those at Ph.D. granting universities (Table III-23). In

TABLE III-23

Place of Alumni Employment

(percent in each category)

Employer	Total	Division* Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Ph.D. univ.	43	46	35	57	41	39
4-Yr. coll.	22	15	10	24	42	21
Other education	6	0	1	2	6	26
Government	8	16	11	7	2	4
Industry/business	12	11	35	2	0	1
Other	7	8	7	6	6	9
Unemployed	2	4	1	2	2	0
N.	1178	162	333	257	232	194

*Actual values differ significantly from expected values at .01 level on chi-square test.

social science and humanities the proportions in higher education exceed 80 percent, but the humanists are as likely to be at four year colleges as at Ph.D. granting universities, while a substanital majority of the social scientists are at the more prestigious institutions. Physical scientists are the only alumni to show up in any large numbers in the ranks of business and industry; they divide evenly between this category and Ph.D. universities. Government takes its highest proportion from the life sciences, while other education (primary, secondary and community colleges) is of significance only to education Ph.D.s.

When we look at the kind of work these alumni are doing the employment picture comes into sharper focus (Table III-24). Almost half of them teach as a primary work activity, but more than another fourth are engaged primarily in research, divided about evenly between basic and applied. Clearly, a very large number, if not a majority, of the research people, as well as the teachers, are at institutions of higher learning. Table III-25 bears this out, showing that 70 percent of the basic research engaged in by these respondents is carried on at Ph.D. granting universities. Almost as many of the applied research people also locate there as are found in government although, not unexpectedly, a majority of applied research Ph.D.s are employed by business and industry. By contrast only 9 percent of the basic researchers are employed in each of those non-university categories.

TABLE III-24

Primary Work of Alumni

(percent in each work activity)

		Division*				
Primary Work	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Teaching	48	36	30	58	80	35
Basic research	13	28	18	15	4	2
Applied research	15	15	32	9	1	6
Administration	15	10	13	7	7	43
Prof. services	7	8	5	9	4	10
Other	2	2	1	2	3	4
N.	1228	169	350	253	245	199

*Actual values differ significantly from expected values at .01 level on chi-square test.

TABLE III-25

Selected Primary Work by Place of Employment
(percent in each employer category)

	Primary Work Activity*			
Employer	Teaching	Basic research	Applied research	Administration
Ph.D. university	53	70	17	23
4-year college	39	2	1	14
Other education	5	0	1	23
Government	1	9	19	17
Business/industry	0	9	51	14
Other	1	8	11	9
Unemployed	1	2	1	0
N.	579	159	176	181

*Actual values differ significantly from expected values at .01 level on chi-square test.

The same proportion of alumni is engaged in administration as in applied research, but the administrators are spread much more evenly over the employer categories. The largest number of them is accounted for by education, where almost half of the alumni are, in fact, administrators, compared to a range of 7 to 13 percent in the other divisions. As Table III-26 shows, almost half of the education administrators are in "other education" and another third are at Ph.D. granting universities. The business and industry administrators, on the other hand, are accounted for almost entirely by physical scientists. The few Ph.D.s in social science and humanities who go into administration tend to work at 4-year colleges, while life science administrators are most likely to be employed by government.

Returning to Table III-24, teaching is clearly the most important activity in all divisions except education, where administration ranks first. Research takes second place in the other divisions. Basic research is most prominent among life scientists, while applied research finds its greatest importance among physical scientists. Much smaller proportions of social scientists work primarily in research, mostly of a basic kind. Ph.D.s in humanities are almost exclusively teachers.

The employment pattern of the women differs significantly from that of the men in several respects, as shown in Table III-27. Fewer of them work at Ph.D. granting universities, a higher proportion are at four year colleges.

TABLE III-26

Selected Primary Work by Employer and Division*

(percent in each employer category)

		Employer						
Primary Work Activity & Division	N.	Ph.D. Univ.	4-Yr. Coll.	Other Educ.	Gov't.	Bus./ Indus.	Other	Unempl
Teaching								
Life Science	60	53	37	2	3	0	2	3
Physical Science	104	64	30	2	1	0	0	3
Social Science	148	63	34	2	0	0	1	1
Humanities	194	44	48	6	1	0	0	1
Education	68	41	41	18	0	0	0	0
Basic Research								
Life Science	47	60	2	0	8	11	15	4
Physical Science	60	68	0	0	12	15	5	0
Social Science	38	82	5	0	10	0	0	3
Applied Research								
Life Science	25	24	4	0	44	28	0	0
Physical Science	112	7	0	0	18	68	6	1
Social Science	22	36	0	0	9	18	36	0
Administration								
Life Science	16	25	6	0	44	13	12	0
Physical Science	45	7	9	0	18	53	13	0
Social Science	18	11	39	17	28	0	6	0
Humanities	16	25	31	19	19	0	6	0
Education	86	33	9	42	8	0	8	0

*Divisions represented by 12 responses or fewer are omitted.

TABLE III-27

Alumni Employment by Sex*

(percent in each employer category)

			Division									
Employer	Total		Life Sci.		Phys.Sci.		Soc.Sci.		Human.		Educ.	
	M	F	M	F	M	F	M	F	M	F	M	F
Ph.D. Univ.	44	37	48	40	34	47	60	48	46	24	37	42
4-Yr. Coll.	20	31	15	11	10	20	22	26	42	47	20	30
Other Educ.	6	8	0	3	1	0	3	2	5	10	28	18
Gov't.	9	6	18	12	11	7	8	5	1	4	4	8
Indus./Bus.	14	2	10	11	36	7	2	0	0	0	1	0
Other	6	9	7	9	7	7	4	12	4	10	10	2
Unemployed	1	7	2	14	1	13	1	7	1	4	0	0
N.	988	201	127	35	318	15	215	42	164	68	154	40

*Actual values differ significantly from expected values at .01 level of confidence on chi-square test.

Only negligible numbers are found in each of the other categories of employment. When it comes to unemployment women outnumber the men 7 percent to 1 percent.

In humanities, which includes the largest number of women, only half as many of them, proportionately, as men are employed by Ph.D. granting universities. This is a much larger differential than appears in any of the other divisions, although social science shows a substanial gap as well. In education, on the other hand, a slightly larger proportion of women are employed at these institutions, while in "other education", where so many of the education Ph.D.s are employed, the men are represented in substantially larger proportion than the women. The smallest sex differences in place of employment are found in the life sciences, although the relatively heavy unemployment of female Ph.D.s prevails throughout four of the divisions. Only in education is there no unemployment for alumni of either sex.

The sex differences in primary work activity (Table III-28) are about what one might expect from the employer pattern. Relatively, more women teach or perform professional services, only half as many women as men are engaged in research, but roughly the same proportions of both sexes are found in administration. Here, too, there are interesting divisional differences. The primary work pattern of women in the life sciences is virtually identical to that of the men. In the social sciences the same proportions of men and women teach, but in humanities the proportion of males

TABLE III-28

Primary Work of Alumni by Sex*

(percent in each work activity)

			Division									
	Total		Life Sci.		Phys.Sci.		Soc.Sci.		Human.		Educ.	
Primary Work	M	F	M	F	M	F	M	F	M	F	M	F
Teaching	46	57	36	35	30	6	59	59	85	71	31	49
Basic Research	14	9	28	29	17	31	16	10	5	0	2	0
Applied Research	16	7	16	15	34	0	9	7	1	1	5	12
Administration	15	14	11	6	12	8	6	12	5	14	48	24
Prof. Services	6	9	8	12	6	0	7	12	2	6	9	12
Other	2	4	1	3	1	0	3	0	2	8	5	2
N.	986	195	128	34	323	13	204	41	167	65	153	41

*Actual values differ significantly from expected values at .01 level on chi-square test.

who are teaching is even higher than that of the females. It is in education that some substantial reversals of pattern show up. Whereas in the social sciences and humanities women are more heavily represented than men in administration, in education twice as many men, proportionately, as women are in administrative work.

With these few exceptions, then, it appears that men and women Ph.D.s differ more substantively in the kinds of places they work than in the kind of work they do. Women are as well represented as men in teaching, throughout, although they are much less likely to teach at the more prestigious Ph.D. granting universities. In education administration, which is such an important component of the careers of alumni in the education division, men are much more dominant.

The period during which an alumnus obtained his Ph.D. does not make any appreciable difference with respect to the kind of work he does. But for the growing number of alumnae there are some interesting contrasts. (Table III-29)

TABLE III-29

Primary Work of Alumni by Graduation Year Group and Sex

(percent in each work activity)

	Graduation Year								
	1962 or earlier			1963-67			1968 and since		
Primary work	All	M	F	All	M	F	All	M	F
Teaching	50	48	68	48	48	48	47	44	59
Basic research	12	14	4	14	13	13	14	15	9
Applied research	13	14	4	14	17	2	16	17	10
Administration	19	18	24	14	13	18	14	15	10
Prof. Services	6	6	0	8	8	13	6	6	10
Other	0	0	0	2	1	6	3	3	3
N.	239	204	25	349	283	54	627	494	115

Relatively more of them are engaged in research with each successive period of degree attainment. Among the classes of the middle 1960's the proportions of women in both basic research and teaching are identical to that of men, but in the older and younger groups of alumni proportionately many more women are teaching and many fewer are in research. The proportion of women in administration declines steadily through the graduation periods, but this may simply reflect the greater likelihood of promotion which comes with maturity.

With respect to place of employment there are significant differences among the three graduation year groups for both men and women (Table III-30). The proportion of men employed at Ph.D. granting universities declines with recency of graduation, while among the women relatively more from the 1963-67 period are employed at such universities than is true for the other periods. Indeed, from this graduate group the proportions of men and women at Ph.D. universities are equal, as they were for teachers and basic researchers. At the same time the proportion of women working at 4-year colleges is smaller among the more recent graduates, especially the 1963-67 group, while for men there is little overall change. Perhaps the most important figures in Table III-30 are the proportions of women who are unemployed. Not only do they far exceed the percentage for men, but the more recent female graduates apparently suffer greater unemployment than their older colleagues.

TABLE III-30

Alumni Employer Type by Graduation Year Group and Sex

(percent in each emplpoyer category)

	Graduation Year*								
	1962 or Earlier			1963-67			1968 and Since		
Employer	All	M	F **	All	M	F	All	M	F
Ph.D. Univ.	46	49	36	44	44	44	41	42	34
4-Year Coll.	22	20	36	23	22	29	21	19	31
Other Educ.	3	3	4	4	4	6	9	8	10
Government	8	8	4	9	9	2	9	9	8
Bus./Indus.	15	15	8	12	14	2	11	14	2
Other	6	5	8	7	6	10	7	7	8
Unemployed	0	0	0	1	0	8	3	1	7
N.	225	200	25	334	282	52	624	501	123

*Actual values differ significantly from expected values at .01 level on chi-square test.

**Column adds only to 96 because 4 percent of the cases were miscoded.

These problems are further documented by the responses to the question "How much difficulty did you have finding suitable employment after obtaining the Ph.D.?" When they are tabulated by graduation year, as in Table III-31, there is a sharp decline in the proportion of alumni experiencing no difficulty in finding employment with recency of graduation, from 71 to 42 percent, and a corresponding increase in those having great difficulty, from none to 9 percent. Only among graduates of the 1963-67 period are there statistically significant sex differences. Indeed, among the most recent graduates men and women have experienced difficulty in almost exactly the same proportions.

TABLE III-31

Alumni Difficulty in Finding Employment by Graduation Year* and Sex

(percent at each level)

				Graduation year								
	Total			1962 or earlier			1963-67			1968 & since		
	All	M	F	All	M	F	All	M	F	All	M	F
No difficulty	55	57	48	71	74	64	67	69	57	42	42	40
Great difficulty	5	5	7	0	0	0	2	1	6	9	9	9
N.	1263	1010	204	245	210	25	353	286	54	647	508	124

*Actual values differ significantly from expected values at .01 level on chi-square test.

The same pattern shows up for each academic division (See Appendix Table III-10.) For most of the divisions the deterioration in job hunting has been fairly gradual, but for the physical scientists the change is sudden and dramatic for the post-1968 alumni -- declining from 74 to 36 percent finding no difficulty, and rising from none to 13 percent experiencing great difficulty. Among educators, too, the change is more drastic for the most recent graduates. Nevertheless among the most recent graduates it is humanities that shows the lowest proportions having no difficulty, 34 percent, and the highest, 15 percent, having great difficulty, although humanities Ph.D.s graduating before 1968 do not differ greatly in their problems from the other divisions.

To complete the picture of alumni employment problems the question was asked "Do you feel you are underemployed in your current position?" The term "underemployment" was not defined, but respondents were asked in a subsequent question to identify the respects in which they feel underemployed. Insofar as they took advantage of this opportunity, seven general categories of job dissatisfaction emerge. Most important is the respondent's judgement that the demands of the job are not commensurate with his or her skills and training. This apparently occurs in all kinds of work -- teaching, research and administration. Many complain of insufficient time for research, for reasons ranging from other demands of the job to lack of graduate student assistants. A number of alumni feel that their level of skill and performance is given insufficient recognition and reward by their employers. Still others feel they are not doing the kinds of tasks they prefer, such as teaching or writing. Some report that there is insufficient demand for their specific expertise either in the job they occupy or in the region in which they reside. Others deplore the institution at which they are employed as of generally inferior quality or lacking high calibre graduate students. Finally, limitations on or unavailability of research funds was offered as a definition of underemployment.

With the subjectivity of these diverse answers well in mind, some interesting quantitative results emerge nevertheless. Two thirds of the alumni feel that they are not underemployed, but 15 percent report that they are, one fifth of them grossly so (Table III-32).

TABLE III-32

Current Underemployment of Alumni

(percent at each level)

		Sex*		Division				
	Total	M	F	Life Sci	Phys Sci	Soc Sci	Human	Educ
No	66	68	54	70	70	68	61	60
Somewhat	19	19	17	14	19	20	20	18
Yes	12	11	20	13	9	10	13	16
Grossly	3	2	9	3	2	2	5	6

*Actual values differ significantly from expected values at .01 level on chi-square test.

Among women, the rate of underemployment is more than twice that of men, and almost five times as many women, proportionately, consider themselves grossly underemployed (although the numbers involved are too small for firm conclusions). These sex differences in the degree of perceived underemployment prevail in all of the divisions (Appendix Table III-11) although men and women appear to prosper and suffer more equally in the social sciences than in the others. Division itself is not significantly associated with underemployment, but physical and social scientists seem to suffer least from underemployment, while education is worst off by this criterion.

Consistent with the reports of difficulty in finding suitable employment, the proportion of underemployed alumni rises with recency of graduation, from 6 percent among the pre-1963 graduates to 21 percent of those completing the degree since 1968 (Table III-33).

TABLE III-33

Current Underemployment of Alumni by Graduation Year

(percent at each level)

		Graduation Year*		
	N.	1962 or earlier	1963-67	1968 and since
No	810	77	70	60
Somewhat	229	17	18	20
Yes	146	5	8	17
Grossly	39	1	3	4

*Actual values differ significantly from expected values at .01 level on chi-square test.

Part-time employment carries mixed connotations. To some it is an undesirable alternative to full-time employment; to others it is a convenient way of introducing flexibility into their professional and personal lives. There is some reason to believe that in recent years part-time employment has become more acceptable as a first choice. Alumni were, therefore, asked three questions about it: "Which of the following (statements) best describes your experience with part-time work in your field since you received the doctorate? If you have sought part-time employment in your field, how much difficulty did you have securing a suitable position? Do you anticipate seeking part-time employment in the future?" The responses are summarized in Table III-34.

TABLE III-34

Alumni Experience with Part-Time Work, by Sex and Division

(percent with each experience)

			Sex*		Division				
	N.	Total	M	F	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Never sought	1083	89	93	72	86	95	87	86	88
Sought, couldn't find	21	2	2	3	2	1	1	3	3
Unwillingly took part-time	25	2	1	7	2	1	2	4	2
Former part-time, new full-time	40	3	3	7	4	1	4	5	3
Now work part-time	45	4	2	11	4	2	7	3	4

*Actual values differ significantly from expected values at .01 level on chi-square test.

Most alumni have never sought part-time work, and only 4 percent of them are currently so employed. Although the number of respondents involved in part-time work is too small to draw valid generalizations, it appears that the experience of women is far different from that of men. Substantially fewer of them responded that they never sought it, 7 percent of them unwillingly took part-time contrasted to only 1 percent of men in that position, and a much larger proportion of women than men who now work full-time formerly worked part-time. The 11 percent of alumni women, who are now working part-time undoubtedly contains a mixture of those who are involuntarily doing so and those who desire this kind of work as a first choice.

The only appreciable difference in part-time experience among graduation year groups is the somewhat larger proportion of post-1968 graduates who have unwillingly taken part-time work. Otherwise the distribution of responses is quite similar for alumni from all periods of degree completion. Nor is there significant difference among divisions. As the table shows, the overwhelming majority in all divisions never sought part-time work. Ph.D.s in humanities and education may be slightly more likely to seek it than the other divisions, and those in the humanities are most likely to have to accept it unwillingly, but in all cases the numbers are very small. The social scientists have the largest representation among those currently working part-time, but there is no way to determine if this is by choice or force of circumstance.

Responses to the question about difficulty in finding part-time employment were not very revealing. Almost all of the respondents reported no difficulty, and only 5 percent of the women and 2 percent of the men reported great difficulty.

Indications of changing attitudes toward part-time work are most clearly revealed in responses to the question about future plans, as shown in Table III-35. Substantially fewer alumni, both men and women, responded "no" to this question than reported on the earlier question that they never sought part-time work. But, as might be expected, more women than men are seriously interested in part-time work, either temporarily or for an extended period. These relationships give some clue as to the voluntary component of the "now work part-time" response in Table III-34. There is very little variation among divisions on the question of future part-time plans. Social scientists and educators are the most interested in this kind of work for a few years, at 6 percent each, while social scientists report 7 percent favoring it for an extended period. Nor is there much variation over graduation year groups, except that the most recent graduates are more favorably inclined to part-time work on both a limited and extended basis.

TABLE III-35

Future Plans of Alumni for Part-time Work*

(percent at each level)

	No	Perhaps	Yes, for a few years	Yes, for extended period
Total	77	14	4	5
Male	81	13	3	3
Female	60	18	11	11

*Actual values differ significantly from expected values at .05 level on chi-square test.

Employment Expectations of Candidates

The sample of candidates was asked four of the same employment questions as the alumni, but in this group the queries were couched in terms of expectations. Comparison of Table III-36 with Table III-23 shows very little

TABLE III-36

Anticipated Employment of Candidates

(percent expecting each place of employment)

		Division*				
Employer	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Ph.D. university	46	45	38	50	52	37
4-year college	24	16	9	27	38	21
Other education	4	0	0	2	2	24
Government	7	17	7	7	1	5
Business/industry	9	9	35	2	1	0
Other	10	13	10	12	5	13
Unemployed	0	0	1	0	1	0
N.	699	115	130	227	149	81

*Actual values differ significantly from expected values at .01 level on chi-square test.

difference between what the candidates expect and where alumni actually work. Social science candidates expect to be employed to a slightly lesser extent than is true for alumni at Ph.D. granting universities and in somewhat higher proportion at 4-year colleges. Exactly the reverse is expected by candidates in humanities. Otherwise the distributions are almost identical.

But candidates appear to differ in the kind of work they expect to do. As Table III-37 shows, 36 percent of them expect to be engaged primarily in research, contrasted to 28 percent of alumni in that type of work (compare Table III-24). Since the proportion of candidates

TABLE III-37

Anticipated Primary Work of Candidates

(percent expecting each work activity)

		Division*				
Primary work activity	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Teaching	45	30	17	53	78	35
Basic research	18	37	27	17	5	1
Applied research	18	21	49	13	2	6
Administration	8	4	2	2	7	44
Prof. services	8	5	4	12	3	12
Other	3	3	1	3	5	1
N.	749	117	142	245	159	86

*Actual values differ significantly from expected values at .01 level on chi-square test.

who expect to teach is only slightly below the percentage of alumni who do, the expected increase in research work is accounted for mainly by the fact that only half as many candidates as alumni expect to be administrators. But the alumni, other than educators, who report current employment in administrative work undoubtedly consist largely of people who started out in teaching or research and "moved up" to administration. Thus overall candidate-alumni differences in primary work activity may be more apparent than real. Indeed, education candidates expect to go into administration in almost exactly the same proportions as alumni.

In fact, candidates in both education and humanities differ hardly at all from alumni in those divisions in their primary work expectations. The same overwhelming majority of humanities candidates expect to teach. The anticipated increase in research activity is actually accounted for by shifts away from teaching in Divisions I to III. The most dramatic changes are expected among the physical scientists where, proportionately, twice as many candidates plan to go into both kinds of research as alumni currently engaged, and only half as many candidates, relatively, expect to teach. Indeed, three quarters of physical science candidates expect to do research work, whereas only half of the alumni in these fields is presently so employed.

Because candidates do not expect significant changes in the types of employers they will work for, it appears that they anticipate considerably more opportunity for research work as a primary activity on university and college campuses. They are also, apparently, contemplating rising research opportunities in the category of "other" employers, whatever that may be, for there are no differences between candidates and alumni in the percentages responding "non-profit organization" or "self-employed" (these three categories have been combined for this report).

Like the alumni, candidates display significant sex differences with respect to employment expectations (Table III-38), but the greater equality expected by the newer cohort of female Ph.D.s is clearly evident. Whereas the 44 percent of male candidates who anticipate employment at Ph.D. granting universities exactly matches the percentage of alumni who are so

TABLE III-38

Anticipated Employment of Candidates by Sex*

(percent expecting each category of employment)

							Division					
	Total		Life Sci.		Phys. Sci.		Soc. Sci.		Human.		Educ.	
Employer	M	F	M	F	M	F	M	F	M	F	M	F
Ph.D. university	44	53	43	50	38	62	49	54	54	48	29	56
4-year college	22	30	17	11	9	13	28	25	30	48	24	16
Other education	4	3	0	0	0	0	1	3	4	0	29	16
Government	7	5	19	11	7	0	6	8	1	2	5	4
Business/industry	11	3	8	11	36	25	2	2	2	0	0	0
Other	12	6	13	17	10	0	13	8	8	2	13	8
Unemployed	0	0	0	0	0	0	1	0	1	0	0	0
N.	506	175	86	18	117	8	158	61	86	62	55	25

*Actual values differ significantly from expected values at .01 level on chi-square test.

employed, the 53 percent of women with the same expectation is substantially higher than the 37 percent of alumnae employed at these institutions (alumnae data in Table III-27). This higher female expectation prevails throughout the divisions, with twice as many women candidates in humanities expecting to work at Ph.D. granting universities as alumnae, in fact, do. At the same time that the women's estimates for this type of employer are rising, in three of the divisions -- life science, social scinece and education -- the men expect to be represented there in lower proportions. The biggest change is anticipated in social science, where 60 percent of male alumni are employed at Ph.D. granting universities, but only 49 percent of male candidates expect to be.

At the same time that these shifts are expected for employment at Ph.D. granting universities, the candidates differ little from the alumni in their estimates of employment at four-year colleges, with two exceptions. Men in humanities apparently expect some shifts from these colleges, to the universities, and, proportionately, only half as many female candidates in education as alumnae expect to be teaching at four-year colleges in the future. Nor do any of the women candidates in humanities expect to find their employment in other education although 10 percent of their alumnae sisters are at these institutions, perhaps for lack of opportunities in their fields.

In their primary work, as in their institutional setting, women candidates anticipate much greater equality with men than alumnae have experienced (Table III-39 compared with Table III-28). Women expect

TABLE III-39

Anticipated Primary Work of Candidates by Sex*

(percent expected in each work activity)

			Division									
Primary work activity	Total		Life Sci.		Phys. Sci.		Soc. Sci.		Human.		Educ.	
	M	F	M	F	M	F	M	F	M	F	M	F
Teaching	41	58	30	35	16	30	56	46	72	86	24	56
Basic research	19	16	35	45	30	10	14	23	5	6	2	0
Applied res.	21	11	21	15	48	40	13	13	2	2	6	8
Administration	9	5	5	0	2	0	2	3	9	3	55	20
Prof. services	7	9	5	5	3	20	12	13	2	3	13	12
Other	3	1	3	0	0	0	4	1	9	0	0	4
N.	550	199	97	20	132	10	171	74	92	67	58	28

*Actual values differ significantly from expected values at .01 level on chi-square test.

to increase their proportions in research beyond the alumnae experience to about the same degree that men do. Indeed, in basic research in the life sciences and social sciences they expect to be employed in larger proportions than men. In contrast to their almunae colleagues, women candidates in social science expect to teach in somewhat smaller numbers, while in humanities and education they expect to go even more heavily into teaching. But the increased proportions of women who will teach expect to do so at the more prestigious Ph.D. granting universities. Women currently taking doctoral degrees in education apparently do not expect any breakthroughs in opportunities for administration, as relatively fewer of them anticipate this kind of work than the number of female graduates currently engaged in it. At the same time, male candidates in education expect to go into administration even more heavily than male graduates. The most discouraging area for women remains the physical sciences, where there are still too few of them to make any meaningful judgements about employment opportunities.

Despite candidates' optimism about not winding up unemployed upon completion of the degree, they do anticipate difficulty in finding suitable jobs (Table III-40). Almost one third of them expect to encounter a good deal of trouble and another 28 percent think it possible that they will have some. Not surprisingly, a significantly higher proportion of

TABLE III-40

Candidates' Anticipated Difficulty in Finding Suitable Employment*

(percent at each level)

Total	N.	No	Possible	Yes, a lot	Don't plan to seek in field
All	740	39	28	31	2
Male	545	43	28	28	2
Female	195	28	28	43	2
Life Sci.					
All	115	40	30	29	1
Male	95	42	28	28	1
Female	20	30	25	35	0
Physical Sci.					
All	140	43	37	19	1
Male	130	4	39	18	0
Female	10	30	20	40	10
Social Sci.					
All	240	36	30	32	2
Male	168	39	27	32	2
Female	71	30	35	34	1
Humanities					
All	154	30	18	49	3
Male	89	40	17	39	3
Female	65	17	20	62	2
Education					
All	86	56	23	20	1
Male	58	60	21	17	2
Female	28	46	29	25	0

*Actual values differ significantly from expected values at .01 level on chi-square test.

women than men expect serious problems. This difference in expectation contrasts sharply with the experience of alumni (Table III-31), among whom there was very little difference in the proportion of men and women who experienced great difficulty after obtaining the degree; in the post-1968 group there was no difference at all.

Among divisions candidates in the humanities, like their alumni colleagues, expect the greatest difficulty, with almost half of them answering "yes, a lot". Almost two thirds of the women, contrasted to 39 percent of the men, are of this opinion. Social science is the next most pessimistic division, however, with expectations about the same for both men and women. Expectations among life scientists are only slightly more optimistic than among social scientists, but the women in the former expect a harder time, as they do among educators, although that division expects the least difficulty overall in finding suitable employment. There are some contrasts here, too, with the alumni, among whom experience has shown much less differentiation among divisions. Physical science has too few women for contrasts by sex, but for the division as a whole about one fifth expect great difficulty, while fewer than half expect no trouble in finding a job. In short, candidates of both sexes and in all divisions seem to believe that they will find employment, but that it will not be easy to come by.

Since a substantial number of candidates anticipate difficulty in finding suitable employment, their attitudes toward part-time work may influence the degree of difficulty they encounter. Sixty percent say they will accept part-time work if nothing else is available (Table III-41), but over a fourth of them are, in fact, looking for part-time work, 10 percent on a permanent basis. This presents a sharp contrast to the alumni, of whom only 9 percent include any part-time work, temporary or permanent, in their future plans and 89 percent of whom never sought part-time work (Tables III-34 and III-35). Among the candidates, as among the alumni, a significantly higher proportion of women than men are seriously interested in part-time work, but where the ratio among alumni is four women to one man, among candidates it is only two to one. Thus it appears that men as well as women are increasingly amenable to this kind of employment.

There is surprisingly little variation among the divisions on this subject. Social scientists and educators have the greatest interest in part-time work; the life and physical scientists have the least. But roughly the same ratios of male to female prevail among the divisions, with respect to both temporary and permanent part-time work. It is interesting to observe that in humanities, where employment alternatives are often perceived to be least flexible, attitudes toward part-time work do not differ from the rest of the academic community.

TABLE III-41

Conditions Under Which Candidates Would Take Part-Time Work*

(percent with each attitude)

	N.	Never	Nothing else available	2-5 Years	Permanent part-time
Total					
All	719	13	60	17	10
Male	525	16	64	12	8
Female	193	5	50	29	16
Life Sci.					
All	113	13	66	12	8
Male	93	15	67	11	7
Female	20	5	55	25	15
Physical Sci.					
All	137	13	66	12	8
Male	127	13	66	12	8
Female	10	10	60	20	10
Social Sci.					
All	230	10	57	21	11
Male	159	13	63	15	9
Female	70	4	44	37	14
Humanities					
All	155	12	64	14	10
Male	89	18	68	7	7
Female	66	3	58	24	15
Education					
All	78	22	45	20	13
Male	52	29	46	17	8
Female	26	8	42	27	23

*Actual values differ significantly from expected values at .01 level on chi-square test for sex, but not division.

Summary

Pulling together the highlights of the analysis, the following picture emerges of the demographic characteristics of the respondents, the career experience of alumni and the expectations of candidates. Among alumni physical science is the largest division, with life science and education the smallest. There are hardly any women in physical science, however. For the 17 percent of alumni who are female humanities is the most important division, and they are least outnumbered there by the men. About half the alumni were between 26 and 30 years of age when they attained the degree, with another fourth 36 or older. On the whole the women tended to be older than the men. Most of the men were married when they received the degree and about half of them had one or two children. Only half the women were married, however, (one third in education) and they were most likely to be childless. Sources of personal financial support while in graduate school depended heavily upon the division. Two thirds or more of the students in life and physical sciences were on fellowships or assistantships, while most of the humanities and education students supported themselves. In all divisions, except social science, proportionately more women than men were supported by fellowship aids. For both sexes aid was more likely to support younger and unmarried students. Most alumni of both sexes worked while writing the dissertation. Only a fourth of the physical scientists worked full time, while over half of the educators did. Women were less likely to work full time than men. Generally, jobs were supportive of dissertation research, especially in physical science but much less so in humanities.

The importance of physical science declined over the alumni graduation year periods and among current candidates social science is the largest division; education remains the smallest. Although women continue to have the largest representation in humanities, approaching equality with men, social science is the most popular division for them too. They still tend to be older than the men, in humanities and education, the oldest divisions for both sexes. Among candidates life science is the youngest division. Male candidates are less likely to be married than male alumni were, although two thirds of them are married. Female candidates, however are more likely to be married than their older Colleagues; over half of them are. Candidates have smaller families than alumni and are more likely to be childless, but these relationships may be distorted by the presence of beginning candidates not as far along in the life cycle. Over 60 percent of all candidates support themselves, but, as among alumni, over half the students in life and physical science are on fellowships, while in education three quarters of the students are self-supporting. Women continue to be supported by fellowships to a slightly greater extent than men, and the young and unmarried of both sexes are also favored. Most candidates also work while writing the dissertation, a larger proportion of both sexes doing so at full time than was true for alumni, but the work is less likely to be directly supportive of the dissertation research.

About half of Michigan Ph.D.s go into teaching as their primary work, almost entirely at institutions of higher education, mainly Ph.D. granting universities. Another fourth are primarily in research, with the basic researchers mostly at the universities and half of the applied researchers in industry. About as many alumni are in administrative work as are in applied research, with the administrators distributed among all places of employment. Physical scientists are heavily in research, especially applied, of whom two thirds work in industry, while social scientists and humanists mostly teach. Life scientists are more evenly divided between teaching and research, mainly basic research in the universities, those in applied research work largely for government. Almost half the educators are in administration at universities and in "other education"; most of the rest teach, dividing themselves between universities and four year colleges.

Women are somewhat more likely to be in teaching than men and much less likely to be in research; they are found in fairly equal proportions in administration. But the women who teach are more likely than men to do so at 4 year colleges. Administration is most important in education, where proportionately men outnumber women two to one. Women are barely represented at all in industry, and work for government in smaller proportions than men. They are far more likely than men to be unemployed.

Finding an appropriate job after graduation has been harder for the recent graduates of both sexes than for alumni who completed the degree in earlier years. About 15 percent of the alumni consider themselves underemployed, with about twice as many women as men feeling this way. The proportion reporting themselves underemployed increases with recency of graduation.

Although most alumni have never sought part-time work, women are much more likely than men both to take it involuntarily and to seek it as a first choice. Both men and women are somewhat more amenable to considering part-time work in the future than they have been in the past.

The expectations of candidates diverge little from the experience of alumni in terms of where they will work, but with respect to primary work activity there are some sharp divisional differences. Candidates in life science, physical science and social science anticipate much heavier concentration in research as a primary work activity, with relatively fewer in teaching and administration. Candidates in humanities and education, on the other hand, expect about the same work patterns as alumni. Only physical scientists anticipate the same rate of employment in industry; the others expect less.

Women candidates anticipate substantially greater equality with men, especially with regard to employment at Ph.D. granting universities. This is reflected in the much larger proportion of female candidates than alumnae anticipating research work, especially basic research in life science, physical science and social science. Women candidates in education have the lowest expectations, however, as relatively fewer of them expect to hold administrative jobs than alumnae currently do, while a higher proportion of male candidates than alumni do anticipate administrative work.

Although candidates are optimistic in not anticipating unemployment upon completion of the degree, about a third of them expect difficulty in finding a suitable job. Substantially more women than men hold this view. Candidates in humanities are the most pessimistic; those in education expect the least difficulty.

Both male and female candidates express far greater interest than alumni in taking part-time work, although the women continue to be relatively more numerous in this category. Social scientists and educators display the most interest, life and physical scientists the least.

IV

WHY A DISSERTATION? HOW RELEVANT IS THE RESEARCH?

It is the production of a scholarly dissertation that distinguishes attainment of the Doctor of Philosophy Degree from all other educational achievements. Thus, the most fundamental issue raised by the survey and, at the same time, the most difficult to probe through a quantitative instrument is the question of the purpose of the doctoral dissertation. What are the objectives sought through this educational experience? What role should it play and does it play in the life of an individual student, both while in graduate school and afterwards in his or her career? What larger societal objectives, if any, are met by dissertation research? If, by answering these questions, we can define the purpose of the dissertation we can approach an evaluation of the personal and social significance of the doctoral degree.

Respondents in the survey were offered two kinds of opportunity to present their views on the purpose of the dissertation. Firstly, they were asked to rate twelve prepared statements of objectives on a scale of one to seven, ranging from "no opinion" to "great emphasis". Candidates were offered an additional scale upon which to rate nine factors which might have motivated them to seek the Ph.D. degree. Alumni and candidates were then asked "Have you any further observations about dissertation objectives?" Although faculty were not posed this question specifically, they utilized short essay space offered elsewhere in the questionnaire to make known their views about the purpose of the dissertation. Indeed, alumni and candidates, as well, often included observations about objectives with answers to other questions and in general remarks [illegible] the end. This commentary provides considerable insight into the basic attitudes and value judgements of the respondents. It will be summarized following presentation of the quantitative responses.

The question of how well or badly the dissertation experience may fulfill the purposes assigned to it by the respondents was not left entirely to voluntary discussion. Alumni were asked directly "How relevant to your career has your dissertation research been?", and inquiry was made of candidates about their expectations on this score. Analysis of the responses to these questions concludes the chapter.

Objectives of the Dissertation

Although a wide rating scale was offered for each of the twelve statements of objectives for the dissertation, respondents were not directed to rank them in relation to one another. Therefore conclusions about the relative importance of these objectives can only be inferred from the frequency of high or low ratings.

On the basis of this kind of inference a majority of faculty, alumni and candidates agree that the dissertation should be directed to the acquisition of broad research skills and the effective organization and communication of research results for the ultimate enhancement of man's fund of knowledge. Following closely in importance are the ability to identify important research problems and the development of high-level skill in solving them. All five of these most highly rated objectives emphasize skill, both technical and communicative. The findings are summarized in Table IV-1.

TABLE IV-1

Most Important Dissertation Objectives

(percent choosing ratings 6 & 7)

Rank order of Total Sample[1]		Respondent Group		
		Faculty	Alumni	Candidates
1	Acquire broad research skills*	63(3)	73	64
2	Organize and communicate research results*	69	72	61
3	Show capability of future contribution to knowledge*	72(1)	63	56
4	Identify important problems	55	55(5)	53
5	High level problem solving skills	54	58(4)	51

[1] Rank order for respondent group shown in parentheses when differs from total.

* Actual values differ significantly from expected values at .05 level on chi-square test.

Although all the respondent groups agree that these five are the most important objectives, only for the last two are they virtually unanimous in their ratings. On the first three objectives they differ significantly in the way they distribute their answers over the rating scale.[1] Thus faculty consider most important the capability of contributing to knowledge, which the other two groups, by inference, ranked third. Furthermore, faculty and alumni were both more emphatic in their choices than candidates, who tended throughout the spectrum of twelve objectives statements to be less certain and less enthusiastic about most choices.

Disagreement about the relative importance of various dissertation objectives is far stronger across division lines, however, than among respondent groups (Table IV-2). Within groups the division frequencies vary significantly for most of the five objectives, indicated by a double asterisk in the table. Within the division, on the other hand, faculty, alumni and candidates respond in fairly consistent mode; such significant differences as do occur among them are marked by a single asterisk.

In two instances the divisional differences of opinion are insignificant. Faculty in all divisions substantially agree about the major importance of potential contributions to knowledge, although only the life and physical scientists actually appear to give it first rank. Similarly, alumni rate high level problem solving skills in a consistent pattern across the divisions, although for educators it comes out third in the inferred rankings.

Consistency of outlook among respondent groups is strongest in life science and social science. There is a significant difference of opinion among faculty, alumni and candidates in those two divisions only about the importance of broad research skills. Physical scientists, in addition to disagreeing about the importance of broad research skills, also differ about high level problem solving skills; alumni and candidates are more emphatic about its importance than faculty.

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[1] For simplicity of exposition only the combined frequency of ratings six and seven are tabulated in this chapter. The significance tests, however, apply to the entire rating distribution for each objective. Therefore, the statistically significant differences will not always be apparent from inspection of the data presented in these abbreviated tables.

TABLE IV-2

Most Important Dissertation Objectives by Division

(percent choosing 6 and 7)

		Division				
Rank order for total group[1]	Faculty	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
1	Show capability of future contribution to knowledge	80	69	67(2)	73(2)*	67(4)*
2	Organize and communicate research results**	74	60	71(1)	71(3)*	78(1)*
3	Acquire broad research skills**	59(5)*	55*	64*	74(1)*	77(2)*
4	Identify important problems**	66(3)	50(6)	58	47(7)	52(6)
5	High level problem solving skills**	61(4)	52*	50	53(4)	51(7)
	Alumni					
1	Acquire broad research skills**	82*	73*	75(2)*	69(2)*	68(2)*
2	Organize and communicate research results**	80	65(3)	80(1)	78(1)*	75(1)*
3	Show capability of future contribution to knowledge**	72	67(2)	61	58(4)*	58(6)*.
4	High level problem solving skills	59(6)	63*	50(5)	50(6)	63(3)
5	Identify important problems**	63(4)	52	58(4)	45(8)	61(4)
	Candidates					
1	Acquire broad research skills**	73*	71*	64*	53(4)*	61*
2	Organize and communicate research results**	63(3)	60(3)	62	60(1)*	58*
3	Show capability of future contribution to knowledge**	71(2)	61(2)	53(4)	54*	44(9)*
4	Identify important problems**	58(5)	50(6)	55(3)	50(6)	51(6)
5	High level problem solving skills**	60(4)	58(4)*	51	37(9)	51

1) Rank order for division shown in parentheses when differs from total group.

* Actual values differ significantly from expected values among respondent groups within divisions at .05 level on chi-square test.

**Actual values differ significantly from expected values among divisions within respondent group at .05 level on chi-square test.

It is in humanities and educationthat the greatest diversity of opinion occurs. Humanists and educators, whatever their status (faculty, candidate or graduate), are the least united among themselves and the least consistent with other disciplines in their views about the purposes of the doctoral dissertation.

Humanists differ most substantially from the others in the much lower ranking they imply for the identification of important problems -- sixth, seventh and eighth among, respectively, candidates, faculty and alumni. And for candidates in this division high level problem solving skills drops to ninth place. For students in humanities the acquisition of general knowledge of a research area and learning the literature and skills for research problems (middle rated objectives for the first three divisions) move into the top five categories; for faculty only learning the literature comes into this group. Humanities faculty differ from their colleagues in other divisions, and from the students in their own, in that they accord greatest importance to the acquisition of broad research skills; for candidates in this division that objective falls to fourth place.

The distinguishing difference between educators and the rest is their much lower emphasis on the capability of future contributions to knowledge. In alumni ratings it takes sixth place and among candidates falls to ninth. Although education faculty do not differ significantly on this question from their colleagues, they do from their students and former students. General knowledge moves into the first five objectives for educators, as it did for humanists, but only for education faculty does learning the literature acquire this status. Education candidates differ from the other members of their division and from fellow candidates in the other divisions in the importance they ascribe to teaching. In fact, their ratings of this factor move it from the bottom three objectives among other divisions and ninth place among other educators into third position for them, replacing capability of future contributions.

Given the heavy participation of life scientists in basic research, it is not surprising that they placed somehwat more emphasis than the others on the capability of making future contributions to knowledge and the identification of important problems as objectives of the dissertation. Similarly, the preference of the humanities and education Ph.D.s for more generalized knowledge and communication skills is undoubtedly closely related to their primary career concerns with teaching on the one hand and teaching and administration on the other.

With one important exception all respondents place the same three dissertation objectives in the least important group (Table IV-3). Faculty implicitly rank tenth, eleventh and twelfth in importance the generation of publishable work, apprenticeship to a research scholar and the relating of research to teaching. Alumni precisely reverse this order. Candidates, however, implicitly place the relating of research to teaching ninth in order of importance, bringing substantial contribution to knowledge down to tenth place. But there is considerably less certainty among all groups as to which objectives are least important than there is about which are most important. The percentages in each group (not shown) choosing the lowest two ratings on the scale for these factors

TABLE IV-3

Least Important Dissertation Objectives

(percent choosing ratings 6 and 7)

Rank order for total group[1]	Objective	Total	Division				
			Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
	Faculty						
10	Generate publishable work**	30	40*	32*	25*	25	21(12)
11	Apprentice to research scholar**	16	20	15	8(12)*	22	23
12	Relate research to teaching**	13	11*	7*	11(11)*	21*	42(9)
	Alumni						
10	Relate research to teaching**	24	22(12)*	11(12)*	18(12)*	34(9)*	45(9)
11	Apprentice to research scholar**	24	26	22(10)	20*	25	32
12	Generate publishable work	21	29(10)*	18(11)*	22(10)*	20	23
	Candidates						
10	Substantial contribution to knowledge	32	31(11)*	31(8)*	33*	34	28(11)
11	Apprentice to research scholar	30	32(10)	29(9)	27*	27	39(10)
12	Generate publishable work	17	21*	12*	14*	23	13

[1] Rank order for division shown in parentheses when differs from total group.

* Actual values differ significantly from expected values among respondent groups within divisions at .05 level on chi-square test.

**Actual values differ significantly from expected values among divisions within respondent groups at .05 level on chi-square test.

are much smaller, in the 20 to 40-odd percent range, than the 60 to 70-odd percent of respondents who rated the most important objectives 6 and 7 on the scale. Furthermore, the largest proportions of "no opinion" response are reported for these least important objectives.

The strongest disagreement occurs in the matter of producing a publishable dissertation. Despite the fact that all three groups give it a low priority, faculty, especially in the first three divisions, consider this objective much more important than their students and former students do. There is more divisional variation among the faculty on least important objectives, however, than there is for their students. Indeed, candidates do not differ significantly at all among divisions about any of them, while alumni are consistent across division lines in their opinions about the generation of publishable work.

Contrary to the situation with respect to the most important dissertation objectives, there is somewhat greater disagreement among respondent groups within divisions about what is least important than there is among divisions within respondent groups. Only in education do all three respondent groups distribute their ratings consistently with one another. In humanities they rate the least important objectives similarly, with the exception of the significantly lower faculty emphasis on the importance of relating research to teaching. In the other three divisions, however, differences on the subject of publication are strong, the faculty considering it much more important than the candidates do, while the alumni maintain a middle position somewhat closer to the faculty. Apprenticeship makes a difference only in social science, with the faculty showing negligible interest in this objective. But the candidates in those three divisions take a distinctive view from other members of the division on the relative unimportance of contributing to knowledge.

Indeed, the question of making a substantive contribution to knowledge is one of the most controversial objectives in the whole list (Table IV-4). It is one of the group of four middle rated objectives, to which about half of the alumni and candidates ascribed a rating of 4 or 5 on the scale (not shown). But almost half the faculty rated it 6 or 7, so that this objective achieved sixth place in importance for them, while it places ninth for alumni and tenth for candidates. This judgement is consistent with faculty stress on the capability of making future contributions to knowledge as the highest ranking dissertation objective.

TABLE IV-4

Middle Rated Dissertation Objectives

(percent choosing ratings 6 and 7)

Rank order for Total Group[1]	Objective	Total	Division				
			Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
	Faculty						
6	Substantive contribution to knowledge**	49	49(8)*	55(3)*	49*	46(8)	36(10)
7	Learn literature**	46	53	37(8)	39	52(5)	68(3)
8	General knowledge of research area**	44	46(9)*	46(7)	31(9)*	50(6)	53(5)
9	Judgement of other's work**	40	54(6)	34	32(8)	45	47(8)
	Alumni						
6	General knowledge of research area **	55	63(4)*	46	49*	64(3)	60
7	Learn literature**	47	57	33	44	58(4)	55
8	Judgement of other's work**	42	52	33	39	46(7)	49
9	Substantial contribution to knowledge	31	34*	30*	28*	29(10)	35(10)
	Candidates						
6	General knowledge of research area**	51	47*	52	48*	59(2)	52(4)
7	Judgement of other's work	43	46	36	46	41(8)	51(5)
8	Learn literature**	42	42	29(9)	43	51(5)	49
9	Relate research to teaching**	36	34*	20(11)*	35*	44(7)*	53(3)

[1] Rank order for division shown in parentheses when differs from total group.

* Actual values differ significantly from expected values among respondent groups within divisions at .05 level on chi-square test.

**Actual values differ significantly from expected values among divisions within respondent groups at .05 level on chi-square test.

But among the faculty there is significant disagreement across divisions about the importance of the dissertation itself making a contribution. This objective ranks much higher among physical and social science faculty than among the others, while alumni and candidates rate it quite consistently lower, regardless of division. Furthermore, with one exception, it is the only middle rated objective about which respondent groups differ significantly in life science, physical science and social science. Humanities and education faculty are in closer agreement with their students about the relative unimportance of making a substantive contribution to knowledge. In fact, humanists and educators do not significantly differ among themselves at all on the middle group of objectives.

The only other important intra-divisional difference of opinion (aside from candidates' positions on relating research to teaching, already discussed) is the higher value placed by alumni and candidates on acquisition of general knowledge of a research area than is acknowledged by faculty in those divisions.

By and large men and women do not differ about what is important or unimportant among dissertation objectives. Both alumnae and female candidates ascribe higher ratings to general knowledge of a research area than the men do, moving it by inference up to third rank in importance. (Only among alumni is there a statistically significant difference in the rating of general knowledge, however.) Conversely, women in both respondent groups tend to rate high level problem solving skills of lesser importance than men do. And for women in both groups the greater emphasis they accord to the generation of publishable work is significantly different from the male point of view. But much of the apparent difference of opinion between the sexes is, in fact, a reflection of divisional differences, somewhat amplified by differing degrees of female representation in the divisions.

Reason for Seeking the Ph.D. Degree

Having ascertained which objectives of the dissertation are of greatest and which are of least importance to the respondents, the question arises as to whether the choices of the candidates and alumni are consistent with their goals for obtaining the Ph.D. degree in the first place? Only the candidates were asked to rate nine reasons for seeking the Ph.D. on a scale of one to five, ranging from "no opinion" to "highly important". As Table IV-5 shows, an overwhelming 85 percent of them emphasize career objectives as the primary reason for obtaining the Ph.D. This pragmatic goal is then followed by three idealistic ones -- scholarly interest, general intellectual growth and contribution to knowledge -- before obtaining a better job comes in at fifth place, with a little over half the group certain about the importance of this objective.

The relative importance of scholarly interest and making a contribution to knowledge is perceived quite consistently by candidates in all divisions, but humanists and educators value general intellectual growth more highly than their colleagues in the other divisions. There are also significant

TABLE IV-5

Ph.D. Objectives Considered Most Important by Candidates

(percent choosing ratings 4 and 5)

Rank order for total Group [1]		Total	Division*				
			Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
1	Career objectives	85	87	86	83	89	82
2	Scholarly interest**	79	80	79	81	82	70(3)
3	Intellectual growth	64	64(4)	56(4)	57(4)	71	81(2)
4	Contribution to knowledge**	63	70(3)	61(3)	61(3)	63	63
5	Better job	57	57	53(6)	5	62	59

[1] Rank order for divisions shown in parentheses when differs from total group.

*Actual values differ significantly from expected values at .05 level on chi-square test.

**Not significant.

divisional differences about the importance of career objectives and a better job, with both of these being more important to humanists than to others, but the differences are not conspicuous in this abbreviated table.

With respect to the Ph.D. objectives of least importance, shown in Table IV-6, four-fifths of the candidates are in agreement that prestige is of least consequence, more preceisely, that the doctoral degree is of little or no importance in attaining prestige. This evaluation is consistent in all divisions (although more educators consider it important, the difference is not statistically significant.) Nor do over half of the candidates think that attainment of the degree will enhance their salary positions or job security, despite their placement of career objectives at the top of the list. On the other hand, over one-fifth of the respondents do rate these two factors important while a substantial 5-6 percent of them register no opinion (not shown), indicating some uncertainty as to their importance. As for the traditional sentiment that doctors of philosophy fulfill a life-long ambition in attaining the degree, the candidates split almost evenly across the range of choices on that one, with a little over half opting for "not very important".

There are significant differences among the divisions on these last three objectives, however. Life-long ambition figures much more importantly in the motivation of life and physical scientists than it does among

TABLE IV-6

Ph.D. Objectives Considered Least Important by Candidates

(percent choosing ratings 4 and 5)

Rank order for total group[1]		Total	Division*				
			Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
6	Life-long ambition	44	50	55(5)	39(7)	41(7)	40(8)
7	Job security	40	36	25(8)	45(6)	59(6)	47(6)
8	Higher salary	36	35	29(7)	36	39	46(7)
9	Prestige**	21	14	20	23	20	31

[1] Rank order for divisions shown in parentheses when differs from total group.

*Actual values differ significantly from expected values at .05 level on chi-square test.

**Not significant

candidates in the other divisions, while job security is much less important for these two divisions than for the others. The differential rating of higher salaries does not show up as clearly, except for its greater importance to educators than to the others.

Although men and women seek similar objectives in their dissertation research once they are in the doctoral program, there are some important differences in their reasons for entering in the first place (Table IV-7).

TABLE IV-7

Ph.D. Objectives by Sex*

(percent choosing ratings 4 and 5)

	Male	Female
Career objectives**	85	86
Scholarly interest**	78	86
Intellectual growth	61	74
Contribution to knowledge**	64	60
Better job	57	59
Life ambition	48	35
Job security	40	48
Higher salary	39	30
Prestige	23	18

*Actual values differ significantly from expected values at .05 level on chi-square test.

**Not significant

Most conspicuously, intellectual growth and job security are of more importance to women (perhaps reflecting a stronger need for personal fulfillment in the context of greater job insecurity), while men are more likely to be fulfilling a life-long ambition, or aiming for higher salary or prestige. On three of the most important Ph.D. goals, however -- career objectives, scholarly interest and contribution to knowledge -- there are no essential differences between men and women. Furthermore, even on those objectives where the differences are significant, they are accounted for largely by divisional variations. Both intellectual growth and job security are more important in humanities and education irrespective of sex, although relatively more women are found in these divisions than the others. Only in social science are there significant sex differences and those are found among the five objectives at the lower end of the inferred rankings.

The interrelationships among these Ph.D. goals raise some interesting questions. As noted, job security and higher salaries do not seem to figure in the career objectives, yet a better job ranks among the more important Ph.D. goals. Are better job and career objectives perhaps defined by current doctoral candidates in terms different from the traditional measurements? Is a clue to be found in the three goals that rank between career objectives and better job: scholarly interest, general intellectual growth and ability to contribute to knowledge? Is a better job implicitly defined as one that is more stimulating rather than one which merely carries a higher salary? Do career objectives include a large dose of "interesting working environment" or "opportunity to make important professional contribution"? These questions were not asked; we can only speculate, and perhaps glean some insights from the essay reponses to open-ended questions.

What the Doctoral Degree Signifies

When given the opportunity to amplify their responses about dissertation and/or Ph.D. goals, the respondents ventilated a great many ideas in a variety of ways. One line of reasoning approaches consensus more closely than any other, however. It proceeds as follows: The Doctorate of Philosophy is a research degree. It should be no more and no less. Ph.D. training presently attempts to prepare a number of careers, however, for which it is inappropriate. Rather than stretch and distort the Ph.D. for these purposes, the University should vigorously maintain standards of excellence of this terminal research degree, while offering other kinds of prestigious terminal training and degrees for non-research fields of endeavor. In this way all students and the society at large can be more adequately served.

This view of the essential role of the Ph.D. follows closely from the respondents' concern for career objectives and acquisition of skills. It is explicitily expressed by faculty, alumni and candidates from a wide variety of departments in every division. For example, a professor of Electrical Engineering comments that the whole doctoral program needs an overhaul, not just dissertation regulations or administrative procedures. He goes on to say that it is aimed at three fields of operation: research, for which the dissertation is justified, although it is often of an "academic nature (impressive, publishable, useless)"; teaching, for which there is no preparation (although research "keeps a teacher 'alive' and current, ... so does reading and thinking"); industry, for which a student is really prepared at candidacy, but he spends two to three years on the dissertation to get an honorable title. The need for different degrees and programs "seems obvious, but they must be equally honorable."

A professor of Physics gives the distinction among student needs a different and somewhat harsher dimension: the one fifth of students who are superior and will achieve in future research, and the four fifths who are mediocre in this regard, but for whom the Ph.D. satisfies a job requirement. A candidate in Bio-Engineering poses the same kind of dichotomous objectives a little more idealistically: acquisition of job skills; and satisfaction of curiosity and exploration of new (radical) ideas. A fellow candidate in Education suggests that the title Ph.D. is too general, that there should be different terminal degrees for the behavioral sciences, the natural sciences and the humanities, which reflect differences in the process of career preparation. An alumnus in Mechanical Engineering speaks for a great many of the respondents when he states that "Scholarship is one of man's great achievements", and suggests that the dissertation should be the highest form of scholarly research, with other degrees offered for other types of scholarly work; presently the Ph.D. is "too many things to too many people." Finally, the need for alternative degrees for students headed into teaching or applied technology is summed up by a Microbiology professor, who believes that "attempts at re-defining the Ph.D. would only lead to confusion, without affecting the availability or quality of such programs. . . they will not become respectable simply by putting the letters Ph.D. on the final certificate."

Only a few examples of general statements about the nature of the Ph.D. and the purposes it should or should not serve have been presented. Widespread conviction that a variety of advanced degrees is needed to serve different kinds of students along differing career paths show up throughout the commentary on numerous aspects of the dissertation.

The other side of the coin of what the Ph.D. should be is the expression of dissatisfaction with what it is now, offered by a smaller number of respondents (the majority of respondents is clearly satisfied with the Michigan doctoral program) but an equally diverse group. At their most charitable they observe that the quality and worth of the Ph.D. and its dissertations varies widely. One candidate in Anthropology illustrated this point by describing how she spent three years learning two foreign languages, one year of field work abroad, and over two years to analyze and write up her results, while another student in another field will "spend six months in a lab and present studies of a few dozen pages of figures", and yet another "has spent over 3 years in deep thought, and will end up with, essentially, one brilliant diagram and its explanation."

Many people expressed the view that the dissertation is frequently superficial, trivial and irrelevant. An education candidate suggests that the process is more a roadblock than a training field, where perseverance seems more important than excellence. An eloquent, if feisty, Political Science alumnus declares that it is not clear to him that the "ordeal of writing a dissertation proves anything beyond a capacity for endurance. What the hell constitutes 'original' research? Any major problem necessitates focusing on much others have done. Universities are "perpetuating a bunch of mandarins who have little respect and effectiveness in the real world." A Botany candidate more laconically observes: "The Ph.D. breeds phony professionalism."

Nor are some of the faculty any less colorful in their condemnations. A professor of Architecture observes that "There is a lot of academic mildew clinging to doctoral research and communication of results", while a colleague in American Culture likens the Ph.D. to a "dinosaur in a pluralistic world". The uneasiness of many people was summarized by a Civil Engineering professor who reported his misgivings about the relevance of the whole Ph.D. process to the real world and society's needs. He expressed his preference for more dissertations "dealing with pressing social, environmental needs and problems, etc., rather than the development of narrow, recondite skills and the successful passage through academic shoals. The quest for a Ph.D. should be more than a tribal rite dressed in a sheepskin."

The controversial question as to whether the dissertation should constitute a contribution to knowledge underlies much of the doubt about the intrinsic worth of a Ph.D. Most students have no illusions on this score. A candidate in Far Eastern Languages and Literature deplores the objective of a substantive contribution to knowledge as a "terrible misrepresentation of the facts of Ph.D. research ... Dissertations do not contribute to 'knowledge' ... they generate data. We are drowning in data and have no time to seek knowledge [defined as wisdom and understanding] at all." A colleague in Education also recognizes that few dissertations "can realistically be expected to make significant, original contributions to knowledge." These more often come from funded professional researchers. Yet "faculty pretend otherwise and students get caught in the middle." A candidate in Anthropology agrees that "insistence that the dissertation be an original and 'important' piece of work (which it rarely is) leads to exaggerated, even dishonest claims ... by students, and, tacitly, these are accepted by faculty." Yet this same individual is not greatly troubled that the dissertation is not a "great scholarly contribution", for if appropriate skills and attitudes have been acquired the contribution will come in the future.

But the notion of contributing to knowledge through the doctoral thesis apparently dies hard, if at all. A Chemistry candidate believes that "university research is a compromise between uncovering or developing useful knowledge and educating the student for his and society's benefit." A professor of Aeronautical Engineering asserts that the dissertation should demonstrate student experience in exploring a problem "in sufficient depth to make an original contribution to knowledge" and that a strong faculty will ensure such high level research. An Art History alumnus believes the thesis should be an original contribution, not just a rehash of someone else's, while one in Natural Resources calls upon the University to raise standards and approve only "original, creative, potentially useful research."

An alumnus in Economics, on the other hand, declares that although he attained the Ph.D. he lost his sense of personal worth as a potential scholar when he realized that he was unlikely to contribute significantly to knowledge, as he had previously believed. Such motivation to personal fulfillment was expressed by quite a number of candidates as an important reason for seeking the Ph.D., although this aspect was not mentioned by faculty or alumni respondents. "To develop something of which I could be personally proud", an Electrical Engineering student hopes for his dissertation; a Psychology student believes that the process should feel positive so he will learn how to live in a good way; a History student hopes "To find greater meaning in one's own life", while a couple of English candidates express the hope of attaining wisdom in one case and enjoyment of an independent project in another. An idea that was expressed by only one person on the questionnaire nevertheless articulates a suspicion often intimated by faculty and parents -- that people don't know what to do with their lives , so they elect to spend four more years in school, viewing education as a consumption good, preferable to working. Finally, a candidate in Far Eastern Languages and Literature tied in the personal fulfillment aspects to the need for changes in the application of Ph.D. training: "My dissertation ... like many others tells far more about a given subject than any sane person wants or needs to know [but] has ... made a certain contribution to my knowledge of myself.

That is its saving grace. Is there not a better way?"

Many of the respondents from all divisions couched "personal fulfillment" more explicitly in terms of the development of creativity, scholarly independence and originality of thought as goals for the dissertation. An Anthropology graduate expressed it well in describing students' dissertation experience as "An opportunity to develop independence, self-confidence, organizational and administrative skills" -- an advance taste of the research life they will lead later on. A Music Education candidate views the experience as an opportunity to experiment with new techniques and approaches; so does a Speech and Theatre alumnus. A professor of Electrical Engineering sums up the faculty position: "In a dissertation I look for originality, creativity, depth of thinking, insight into the problem, logic,critical questioning, etc. Too often I find a rather routine application of standard techniques, or a rehashing of someone else's work -- pedestrianism, evidencing at most perseverance."

The intellectual disciplinary aspects of dissertation research are valued by students in all divisions, expressed as appreciation for the rigor of scientific method, development of in-depth objectivity, intellectual honesty, the ability to judge one's own work, self-discipline. In short, the process is more valuable than the results. An alumnus in Education summarized this line of thought: the Ph.D. should be pursued for "intellectual stimulation and its own intrinsic satisfaction," not as a union card.

But there were those among the candidates and alumni who admitted quite frankly that they pursued the Ph.D. primarily for its worth as a union card. An alumnus in Natural Resources described it as a steppingstone to employment. A candidate in Physiology hopes to get to know others in the field for future job prospects, while a Clinical Psychology candidate wants the degree for professional certification. Four candidates in social sciences expressed the desire merely to get the degree, "to get it done". A candidate in Higher Education boldly asserts that he needs the degree, that "This is the first and last research I shall do. The dissertation is simply an obstacle between me and the type of administrative position I seek."

Relevance of Dissertation Research

Having attained the degree -- whether as a union card or to make a significant contribution to knowledge -- how relevant to a future career does it all turn out to be? To what extent are the articulated objectives, in fact, realized?

In the question asked of alumni "How relevant to your career has your dissertation research been?", relevance was not defined. But according to whatever subjective definition respondents used, only one-fourth of the alumni find their dissertation research to be both directly relevant and essential to their careers (Table IV-8). Another 30 percent considers it directly relevant, if unessential. But the largest group, 38 percent, feels the reserach has been relevant in only a general way. In short, the dissertation may have been professionally enriching to most alumni, but it was not necessary to the careers of more than 25 percent of them. This is not to say that the Ph.D. Degree was not important to their careers; the question was addressed only to dissertation research.

TABLE IV-8

Relevance of Dissertation Research to Subsequent Alumni Career

(percent at each level)

	Total	Division*				
		Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Directly relevant and essential	25	31	19	32	27	23
Directly relevant, non-essential	30	31	26	31	30	37
Relevant in general	38	36	49	30	32	35
Not relevant	5	1	6	5	6	4
Don't know	2	1	0	2	5	1
N.		174	354	267	253	203

*Actual values differ significantly from expected values at .01 level on chi-square test.

There is no appreciable difference between men and women in this assessment of the dissertation's benefits. But differences among academic divisions are significant. Most divide their responses roughly evenly, at about one-third each, among the three degrees of relevance, but the physical scientists differ sharply from the rest. Only 19 percent of them have found the dissertation research to be both directly relevant and essential, while almost half of them consider it relevant in a general way, and 6 percent conclude that it wasn't relevant at all. Social scientists and humanists experience a similar lack of relevance. Social scientists are also the most likely to find the research both directly relevant and essential, however, while educators are most inclined to find it relevant but not essential.

Candidates were asked the same question, in terms of expectations rather than experience. The distribution of their responses does not differ greatly from that of the alumni (Table IV-9), although there are more of them who answered "Don't know" and fewer of them expect the research to be essential to their careers. Divisional differences among the candidates are not the same kinds that appear among the alumni. The physical science candidates are not as conspicuoulsy out of step with their colleagues, although they, like alumni in the same fields, have a far lower expectation of both relevance and essentiality than anyone else.

TABLE IV-9

Relevance of Dissertation Research to Subsequent Career

Expectations of Candidates

(percent at each level)

		Division*				
	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Directly relevant and essential	21	18	12	26	26	20
Directly relevant, non-essential	37	46	35	33	35	41
Relevant in general	32	30	39	32	33	24
Not relevant	6	3	8	6	3	8
Don't know	4	3	6	3	3	7
N.		174	354	267	253	203

*Actual values differ significantly from expected values at .05 level of confidence.

Among candidates the life scientists also have low expectations on this score. Like the alumni the physical science candidates have a high expectation of non-relevance. So do the educators.

One would expect judgement on the question of dissertation relevance to be conditioned by experience and so, in fact, it is, as the following tables illustrate. It is not surprising to find in Table IV-10 that Ph.D.s employed at four year Ph.D. granting universities show the highest proportion, 36 percent, of alumni who have found their dissertation research to be both relevant and essential. Alumni in other areas of educational work and in government mostly follow the pattern of the whole group, with the major exception of the disproportionately large number of primary and secondary school employees who have found their dissertation research to be directly relevant, though not essential, to their work. These respondents are probably school system administrators who have taken their Ph.D.s directly in that field.

TABLE IV-10

Relevance of Dissertation Research by Current Employer of Alumni*

(percent at each level of relevance)

		Level of Relevance				
Employer	N.	Directly relevant and essential	Directly relevant, non-essential	Relevant in general	Not relevant	Don't know
Total	1234	25	30	38	5	2
Ph.D. Univ.	528	36	31	29	2	1
4-Yr. Coll.	272	24	31	38	6	1
Jr. Coll.	24	17	29	46	8	0
Public Sch.	52	13	44	35	4	4
Fed. Gov't.	79	20	34	38	6	1
State/Loc. Gov't	21	29	29	33	9	0
Non-Profit Org.	37	13	22	51	14	0
Indus./Bus.	149	6	23	62	9	0
Self	26	27	11	35	19	8
Other	22	22	52	26	0	0
Unemployed	23	4	14	41	9	32

*Actual values differ significantly from expected values at .01 level on chi-square test.

The largest numbers of alumni who have found their research to be irrelevant to their careers are found among the self-employed and those working for non-profit organizations. It is likely that many of these people are not working in the fields in which they were trained. Finally, it is no surprise to observe that almost a third of the unemployed alumni don't know whether their dissertation research is relevant or not.

The distribution of responses on dissertation relevance by primary work activity, Table IV-11, is more revealing. Almost half of those engaged in basic research have found their dissertation research both relevant and essential, a proportion one might readily expect. But people engaged in applied research do not share this experience. Less than a fifth of them have found the dissertation both relevant and essential, while almost half have found it relevant in only a general way. These relationships, especially the responses of those engaged in basic research, bear out the emphasis alumni place on the acquisition of resaerch skills and development of the ability to contribute to knowledge as objectives of the dissertation. They also emphasize the value of the Ph.D. as a research degree.

TABLE IV-11

Relevance of Dissertation Research by Current Primary Work Activity of Alumni*
(percent at each level of relevance)

		Level of Relevance				
Primary Work	N.	Directly relevant and essential	Directly relevant, non-essential	Relevant in general	Not relevant	Don't know
	1220	25	30	38	5	2
Basic research	163	44	33	21	1	1
Develop. & Appl. Res.	177	18	30	46	6	0
Teaching	583	29	30	36	4	1
Administration	183	11	36	44	7	2
Prof. Services	84	11	25	51	13	0
Other	30	13	10	53	10	13

*Actual values differ significantly from expected values at .01 level on chi-square test.

The remainder of the distribution is about what one might expect, with the direct relevance of the dissertation declining as one moves to more generalized professional activities. It is interesting to note that, relatively, almost twice as many people engaged in professional services as in administration found their dissertation resaerch not relevant, but no judgements can be made since professional services is an ill-defined category.

Candidates' expectations about the relevance of the dissertation conform in part to alumni experience. Like the alumni candidates in physical science have the lowest expectations of relevance and social science candidates have the highest, but the humanists are equally optimistic.

Summary

Fauclty, alumni and candidates are generally agreed that the Ph.D. is a research degree, and that its salient characteristic is the dissertation. The degree is sought primarily for the attainment of career objectives, although personal enrichment through scholarly interest and general intellectual growth follow close behind in importance. As the major instrument for pursuit of a research degree the dissertation should promote the acquisition of research and communication skills and demonstrate the ability to make future contributions to knowledge. Faculty emphasize contributions to knowledge (the most controversial objective), both at present in the dissertation and in future, more than their students do; alumni and candidates are more concerned with skills. There is more diversity of opinion about dissertation objectives within humanities and education than within the other divisions.

The significant differences among divisions fall, by and large, where one might expect to find them. The life scientists and physical scientists are most oriented to problem solving and contributing, thereby, to the advancement of knowledge. To a lesser extent the social scientists are concerned about essentially the same things. Ph.D.s in humanities and education, on the other hand, have a greater interest in more generalized research skills and place greater emphasis on communication, to the public and to students in the classroom.

Although half the alumni have found the dissertation research relevant to their careers, only one fourth have found it essential. People engaged in basic research have been most likely to find it essential, followed by those in teaching. Among divisions, social scientists have found the dissertation research most useful, physical scientists the least. It is reasonable to conclude that, with the probable exception of primary and secondary school administrators, the more academic the employment situation and type of work the more directly relevant the dissertation research has been.

V

THE DISSERTATION DOCUMENT

Survey questions about the dissertation itself fall into four major categories: the process by which the topic is selected; evaluation of seven procedural aspects of dissertation production; costs of the dissertation research and sources of its funding; publication issues. Actual content of the dissertation, or the standards for its evaluation, were not directly addressed by the questionnaire, but these matters were brought up by numerous respondents in their individual commentary.

Selection of the Topic

As might be expected almost two thirds of doctoral students propose their own dissertation topics (Table V-1). But another fifth of the candidates and a fourth of the alumni report that their chairman made the initial suggestion, while eight to ten percent predicated the topic on the basis of the availability of research funds.

TABLE V-1

Method for Selecting Dissertation Topic

(percent reporting each method)

		Division*				
	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Alumni						
Chairman assigned	6	10	11	2	5	2
Chairman proposed	25	34	42	19	17	6
Student proposed	61	50	35	69	77	87
Availability of funds	8	6	12	9	1	6
No topic yet	0	0	0	1	0	0
Candidates						
Chairman assigned	4	6	10	0	3	1
Chairman proposed	21	35	42	9	16	6
Student proposed	63	44	25	79	81	85
Availability of funds	10	14	22	9	0	3
No topic yet	2	0	2	3	1	6

*Actual values differ significantly form expected values at .01 level on chi-square test.

Life and physical scientists report a very different topic selection process from their cohorts in the other three divisions. This difference is more pronounced among candidates, but statistically significant in both groups. Well over a third of the students in the first two divisions apparently have their topics suggested by their chairman, contrasted to a mere 6 percent among educators at the other extreme. Conversely, well over three quarters of the students in social science, humanities and education propose their own topics, while only a fourth of physical science candidates do (although half of the life science alumni did). And about ten percent of students in life and physical science report that their topics were actually assigned by their chairman.

The number of responses in the category "availability of research funds" is small, but they carry some important implications. The impact of this factor is of concern mainly to life and physical scientists. And, relatively, about twice as many candidates as alumni in those fields have based their topic selection upon the availability of research funds. A high 22 percent of the physical science candidates now fall into this category. This situation has caused anxiety to at least one professor of Electrical Engineering, who so commented on the questionnaire.

Evaluation of Dissertation Procedures

All three respondent groups were asked to evaluate a series of procedural components of the dissertation process. These procedures were identified in two sets of questions with slightly different rating scales. In the first set, shown in Table V-2, four ratings were offered in addition to "no opinion", ranging from "needs substantial revision" to "good". Six procedures were evaluated on this scale, from the initial research problem selection and prospectus preparation to the final oral examination.

Faculty express the greatest satisfaction with each of these procedures; from half to three quarters of them chose ratings of good or adequate. The alumni are somewhat less enthusiastic, while only about 35 to 45 percent of the candidates selected the two highest ratings. But the candidate responses are difficult to interpret, as up to 47 percent of them answered "no opinion". These are no doubt accounted for by the 50 percent of candidate respondents who are only three quarters of the way through the dissertation process, or less, and who, therefore, have no basis for evaluating some of the components. Nevertheless, on the questions of "prospectus procedures, selection of a problem" and "the generally accepted set of standards regarding what a dissertation should represent",

TABLE V-2

Evaluation of Procedural Components of the Dissertation*

(percent with each opinion)

			Evaluation		
	Good	Adequate	Could be improved	Needs revision	No opinion
Faculty					
Prospectus & problem selection	12	42	33	9	5
Expected scope	15	51	24	4	6
Standards	14	37	33	14	2
Format	22	53	16	5	4
Evaluation when complete	17	48	25	8	2
Final oral	19	52	16	9	4
Alumni					
Prospectus & problem selection	12	35	33	8	11
Expected scope	17	42	21	4	16
Standards	20	34	28	10	8
Format	26	48	11	4	11
Evaluation when complete	20	44	21	5	10
Final oral	26	48	11	4	11
Candidates					
Prospectus & problem selection	8	27	38	13	14
Expected scope	9	35	25	7	24
Standards	10	27	33	17	13
Format	12	34	13	8	33
Evaluation when complete	8	27	19	6	40
Final oral	10	28	11	4	47

*Actual values differ significantly from expected values at .01 level on chi-square test.

where the fewest candidates registered no opinion, only a little over a third indicate satisfaction. Indeed, these are the two procedures about which the faculty and alumni, as well, are least satisfied. Roughly a third to a half of them call for revision or improvement. Strongest approval is reported for "the format of the written document" and "the nature and timing of the final oral examination." Generally, the pattern of differences among respondent groups prevails through the divisions.

The questions dealing with format regulations, the operations of dissertation secretary's and the scheduling of dissertation stages office were asked in two parts, one referring to the adequacy of these procedures, the other inquiring about flexibility.

In each case there were three ratings offered in addition to "no opinion". These evaluations are shown in Table V-3. Significant numbers of the respondents checked the "no opinion" category. This response was especially frequent among the candidates, probably reflecting the fact that many of them had not yet reached the dissertation stage. Least doubt is expressed about the adequacy and flexibility of the regulations regarding the written format of the dissertation in that the lowest "no opinion" response

TABLE V-3

Evaluation of Graduate School Dissertation Procedures*

(percent with each opinion)

		Adequacy		
Format regulations	Good	Adequate	Needs revision	No opinion
Faculty	14	44	27	15
Alumni	16	47	22	15
Candidates	5	34	34	26
Dissertation secretary procedures				
Faculty	18	39	17	26
Alumni	19	41	16	24
Candidates	10	23	16	50
Scheduling of dissertation stages				
Faculty	17	41	14	28
Alumni	17	43	13	27
Candidates	7	21	18	54

		Flexibility		
Format regulations	Too much	About right	Too little	No opinion
Faculty	4	49	26	20
Alumni	4	50	21	25
Candidates	3	29	28	40
Dissertation secretary procedures				
Faculty	3	49	19	29
Alumni	2	50	17	31
Candidates	1	27	17	55
Scheduling of dissertation stages				
Faculty	2	54	14	30
Alumni	2	51	14	33
Candidates	2	22	17	59

*Actual values differ significantly from expected values at .01 level on chi-square test.

was recorded for this question. About a fourth of the faculty are critical on both counts, as are about a fifth of the alumni, while half or almost half express satisfaction.

Table V-3A is derived from Table V-3. It shows the percentage of those who expressed an opinion who marked one of the favorable categories -- either "good" or "adequate" in the one instance and "about right" in the flexibility category. The high values in this table indicate little general concern about the character of Graduate School dissertation procedures. The alumni are most positive as a group and the candidates are least positive, but even among the candidates, a significant majority express positive opinions. Neither the dissertation secretary procedures nor the scheduling of dissertation stages drew much fire in the open ended comments on these items. In fact, two alumni in Botany and one in Psychology took the trouble to point out that the dissertation secretaries were "the most helpful persons outside of the committee" and "the highest order professionals" in one's graduate career.

Of the three procedures evaluated in Table V-3, the one which drew the least favorable response (although largely favorable) was the item on format regulations. It is a requirement of the graduate school that dissertations be published. The majority meet this requirement through publication in University Microfilm form, and the format regulations

TABLE V-3A

Mean Percentage Responding Favorable of Those Who Express Some Opinion

	Good Plus Adequate	Flexibility About Right
By Procedure		
Format Regulations	65	59
Dissertation Secretary Procedures	74	67
Scheduling	75	68
By Group		
Faculty	75	69
Alumni	78	72
Candidates	60	54

which appear in the Handbook for Doctoral Candidates is a minimum set for that type of publication. These are less restrictive than the requirements of commercial publishers or professional journals. In spite of this, the format requirements were severely criticized.

This presents a paradox. Whereas in the quantitative evaluations strongest satisfaction is registered for "format of the written document," and the criticism of format regulations appears fairly mild on the rating scales, the commentary is outspokenly harsh on just those topics. Faculty in Romance Languages and Library Science describe them as petty, superfluous and expensive, while a Psychology student calls them "absurd". A political science candidate minces no words when he says that there is an "incredible amount of formalistic busy work required to meet often trivial and bureaucratic, not scholarly, criteria." A Zoology candidate speaks for several others when he says "Too much time and nervous energy is wasted in preparing the final copy of the thesis to meet the requirements of format."

This presumed waste is a concern to many -- the Sppech candidate who found that chasing regulations took moer time than writing the final draft, the History candidate, among others, who points out that the format rules impose heavy typing expenditures, and the candidates in Music Education, Physics and Geography who assert that not only do the physical details add heavily to cost but they have nothing to do with quality or educational value. A Romance Language student carries this idea further, to the notion that Rackham is more concerned with form than content. Many faculty agree. A Psychiatry professor speaks for others when he says that "The Graduate School with its insistence on letter-of-the-law narrow limits of the dissertation turned a potentially creative process into something like a ritualistic hazing." A professor of Metallurgical Engineering specifically proposes elimination of the dissertation requirements for: list of figure captions, a separate section for literature review; regulations about the size and type of paper; and form of pagination. A candidate in Zoology asks at least that format requirements be spelled out in greater detail in the Handbook and goes on to propose that Rackham approve a typing service responsible to it so that students might, in effect, hand their dissertations into Rackham for typing and be assured of compliance with the detailed format regulations.

Most of the fire, however, is directed toward the procedures and practices maintained by departments rather than by the Graduate School. Excessive length is a concern to a number of people. A candidate in Geography states that "Excessive size and formality of the project make it forbidding", while one in History avers that the current notion of an appropriate dissertation in that department is based on size, which results, in his opinion, in a waste of writing and reading time. An Economics candidate states simply that he favors the current tendency in that department to shorter dissertations. This point of view is seconded by faculty members in Microbiology and Atmospheric and Oceanic Science. An alumnus in Speech proposes abolition of the unofficial minimum length that seems to be commonly accepted, while one in Education goes even further, to suggest that the dissertation should be reduced to an "economical and manageable project" that the average person could complete in one half year.

In addition to format regulations, as much or more concern is expressed about the kind of entity that is presented in fulfillment of the dissertation requirement. This commentary reinforces the doubt that shows up on the quantitative ratings with respect to "the generally accepted set of standards regarding what a dissertation should represent." Other kinds of design than the traditional model are called for by faculty, candidates and alumni in many fields across division lines. This reflects a deep concern for individual creativity and the maintenance of high standards of performance as well as recognition for academic diversity. An Architecture alumnus speaks for many when he says that the form of the dissertation as a research project "should follow the highest standards of the discipline, not an arbitrary formula applied to all disciplines" as it does now. Fellow graduates in fields as diverse as Botany and Speech concur that more flexibility is needed with respect both to the kinds of research undertaken and the reporting of it. Alumni in Sociology and Education feel that the departments give only lip service to diversity in topic and approach, so that the dissertation becomes a hurdle.

A faculty member in American Culture believes there is too much emphasis on scholarly research at the expense of originality, while one in Education suggests that "designing several studies would be a better experience [to] further the creative process." A professor of Urban and Regional Planning points out that in policy oriented fields more flexibility is needed with respect both to topic and format "to get away from academically respectable trivia and into real policy analysis." He goes on to suggest that the present written format "assumes an imitation book", but a variety of materials like gaming simulations, films, etc. is often desirable. Faculty colleagues, as well as students in other fields, agree that new technology and other media should be incorporated into format rules. Computer output, videotape, movies, microfilm, theatre performance and direction, papers presented at professional meetings and substantive grant reports are all specifically suggested by people from disciplines ranging from Chemistry to Linguistics.

The desirability of alternatives to or substitutions for the dissertation as evidence of advanced academic achievement is reiterated in connection with form and content as well as goals for the dissertation. This sentiment is most strongly articulated by students in Clinical and Education Psychology. One in the latter field suggests that the Graduate School "should be initiating other kinds of projects that could qualify people for their Ph.D., substitutions acceptable for dissertation." A Psychology candidate asks why require a thesis if the candidate achieves in class work; if he has "an idea worth researching... award the Ph.D. with honors."

Group research interests people in several departments. A professor of Architecture suggests that group projects offer a comprehensive examination of the topic from several points of view, and goes on to say that demonstration projects in real world situations are desirable. A candidate in Urban and Regional Planning would like the group dissertations considered, although he concedes that policing of individual standards would be difficult. A Linguistics candidate, on the other hand, reports that his department is already very progressive in allowing joint dissertation research.

While concern with dissertation quality is implied in the discussion of form, a number of respondents addressed specifically the problem of evaluating content. Evaluation procedures were not severely criticized in the rating questions, yet many people are highly dissatisfied with the quality of dissertations. Two candidates in Political Science are particularly eloquent. One declares that much of the research in the field is "redundant reiteration", while another concludes that dissertations in that department are mediocre, their "main shortcoming... is that most begin over-ambitiously, dangle for lack of direction, and are completed out of desparation [sic] as time limits draw near." A faculty member in Architecture agrees that "Dissertations are mostly dull -- you would think none of us had learned anything about communication in the last 70 years." A colleague in Nuclear Engineering sees "improving uniformity of quality" as the most difficult problem. An alumnus in Chemistry concurs that too much research is trite and irrelevant, but he places the blame on the donors of grants rather than the University.

Dismay over the quality of presentation is expressed by people in many fields. A professor of Astronomy says that the quality of English in disssertations "should be brought up to accepted standards"; otherwise we fail to prepare students for publication and future communication with colleagues. A member of the English faculty calls for more emphasis on the quality of writing. An alumnus in Speech proposes that a solid graduate course in grammar, writing and research be required of all candidates.

Candidates were the only ones to talk about topic selection as a determinant of ultimate quality. A History student observes that the topic is usually too narrow in scope to be of any practical use in the future, or of interest to more than a handful of people. A Mechanical Engineering candidate believes there is too much emphasis placed on the problem being studied and too little on method. He suggests that it is probably more useful to define and solve several smaller problems than one huge one. A candidate in Comparative Literature suggests that shopping for a topic could be reduced if thought, consultation and guidance were given the student early in the M.A. stage.

Changes in the evaluation process are proposed by several faculty and alumni respondents. A professor of Electrical Engineering asserts that the evaluation procedure for completed dissertation needs clarification particularly with respect to the "minimum acceptable amount of work." A colleague in Chemical Engineering regrets that the Graduate School currently sets minimum standards instead of a norm of excellence; many departments are "way ahead of Rackham" in their standards. An alumnus, who did not identify his department, suggests a formal, periodic evaluation of dissertation progress. A professor of Environmental and Industrial Health proposes that committee members' evaluations on prelim and final defense examiniations be submitted in writing to the graduate dean, in order to avoid pressure by senior faculty to pass inadequate students.

For many respondents the place for reform is the final oral examination, despite the apparent satisfaction with this procedure on the quantitative ratings. A faculty member in Chemical Engineering calls for the oral to be set up with the possibility of failure, declaring that the present practice leads to the passage of weak dissertations. An Economics colleague asserts that "The oral defense is completly superfluous" because it is almost never scheduled until after the committee has approved the final draft. Faculty, alumni and candidates in every division who comment on this topic, uniformly agree that the necessary reform can be accomplished either by abolishing the oral entirely, unless specifically requested by a doctoral committee or failed student, or by holding it on the basis of the penultimate draft so that the thesis can be modified or, if necessary, failed without inordinate expense to the student.

Dissertation Costs

In addition to the opportunity cost of income foregone while in graduate school most students incur direct research and production costs in the preparation of a doctoral dissertation. Alumni and candidates were asked about the level of their expenditure to defray these costs; faculty were asked how much the average candidate in the department spends. And, as Table V-4 shows, the answers they gave differed significantly. At cost levels under $2000 faculty tended to estimate lower

TABLE V-4

Direct Costs of Dissertation Research*

(percent at each cost level)

Dollars	Faculty	Alumni	Candidates
Under 500	31	26	18
500-999	18	19	13
1,000-1,999	17	21	31
2,000-2,999	10	7	11
3,000-4,999		9	11
5,000 and over	24	17	16

*Actual values differ significantly from expected values at .01 level on chi-square test.

direct costs than both candidates and alumni. Above that amount they differed little. Alumni, in turn, reported lower research costs than candidates did up to $5000, at which level the proportions were about the same. This raises the question whether dissertation research costs have, in fact, been rising.

There are significant differences in costs incurred among the three graduation year groups of alumni, but no general trend emerges from Table V-5. It appears that less was spent by alumni completing their degrees between 1963 and 1967 than in the other two sets of years, up to $3000 of costs.

TABLE V-5

Direct Costs of Dissertation Research by Graduation Year of Alumni

(percent at each cost level)

	Graduation year*		
Dollars	Before 1963	1963-67	1968 and since
Under 500	20	34	24
500-999	20	18	20
1,000-1,999	20	16	24
2,000-2,999	7	5	8
3,000-4,999	11	10	8
5,000 and over	20	17	16

*Actual values differ significantly from expected values at .01 level on chi-square test.

That is, a substantially larger proportion spent less than $500 in those years than in the others, while correspondingly smaller percentages spent between $500 and $3000. The percentage of alumni reporting costs in the two highest categories shows a steady decline over the three graduation periods, but the changes are too small for discernment of a trend.

The variations in research costs over the years among the three groups of alumni and between alumni and candidates are probably not as important as the very striking differences in research costs by division, for both alumni and candidates, that show up in Table V-6. Looking first at the alumni, it is apparent that the most costly research is carried on in the life and physical sciences, where about a fourth of the group spent $5000

TABLE V-6

Direct Costs of Dissertation Research

(percent at each cost level)

		Division*				
Alumni	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Under 500	26	11	26	21	47	20
500-999	19	11	14	23	21	29
1,000-1,999	21	25	16	21	17	30
2,000-2,999	7	13	6	6	4	9
3,000-4,999	9	15	11	11	6	5
5,000 and over	17	25	27	18	5	7
Candidates						
Under 500	18	5	25	11	37	10
500-999	13	6	7	17	16	17
1,000-1,999	31	29	20	32	32	45
2,000-2,999	11	16	10	13	5	8
3,000-4,999	11	17	12	12	5	10
5,000 and over	16	27	26	15	5	9

*Actual values differ significantly from expected values at .01 level on chi-square test.

or more. Although only 11 percent of the life scientists spent less than $500, a fourth of the physical scientists spent that little. Apparently, in the latter division doctoral research tends to the extremes, either very expensive or very inexpensive. Social scientists spread out more evenly across the scale, but two thirds of them spent less than $2000 on doctoral research, as did three quarters of the education alumni. Humanities is clearly the least expensive division in which to write a dissertation. Almost half of those alumni spent less than $500 and over two thirds spent less than $1000.

Only in life and physical science does the alumni pattern of expenditure essentially repeat itself among candidates. Among the other divisions, and to a lesser extent in physical science, $1,000-$2,000 becomes a much more important cost level for candidates than it was for alumni and, indeed, more than any other category among the candidates themselves. As the candidates could only offer estimates on the questionnaire it is entirely possible that this shift is explainable in terms of their prudence in estimating costs at a higher level rather than a lower one. They may, in fact, wind up spending no more than alumni did. But insofar as the candidates' estimates may be accurate, the proportion of social scientists and educators who spend less than $500 declines from one fifth of the alumni to 10 or 11 percent of the candidates, although one third of the humanities candidates are still spending that little. But candidates do not anticipate spending appreciably more than alumni at the top expenditure levels.

Table V-7 shows that female alumni tended to spend less than the males. That is, relatively more of the women show up at the lower end of the scale and fewer at the top. Among candidates an equal percentage of both men and women estimate they will spend less than $500, but considerably more of the men will spend $5000 or more. These sex differences are accounted for mainly by divisional differences, however, because within divisions there are no significant differences between the expenditure levels of men and women.

TABLE V-7

Dissertation Research Costs by Sex*
(percent at each cost level)

	Alumni		Candidates	
Dollars	Male	Female	Male	Female
Under 500	25	31	18	18
500-999	19	20	13	15
1,000-1,999	20	25	29	36
2,000-2,999	7	6	10	12
3,000-4,999	9	9	11	10
5,000 and over	19	8	19	9

*Actual values differ significantly from expected values at .01 level on chi-square test.

In financing the out-of-pocket costs of the dissertation over a third of the alumni depended upon personal funds, while a fourth received federal grants (Table V-8). The remainder were distributed among department, university and other grant sources. Once more the differences among

TABLE V-8

Source of Funds to Defray Research Costs

(percent using each source)

		Division*				
Alumni	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Personal	38	8	13	32	72	71
Federal grant	26	56	40	25	4	7
Department	10	12	19	10	1	3
University grant	12	12	11	17	10	7
Other grant	7	6	9	10	5	6
Other	7	6	8	6	8	6
Candidates [1]						
Personal	25	7	7	25	66	84
Federal grant	45	74	67	17	4	3
Department	7	13	8	5	3	0
University grant	10	2	4	31	15	10
Other grant	8	4	10	14	10	0
Other	4	0	4	8	3	3

*Actual values differ significantly from expected values at .01 level on chi-square test.

[1] Faculty responses used as surrogates for candidates.

divisions are striking. Life science and physical science alumni were the most heavily supported by federal grants, and physical scientists reported the largest proportion of alumni to obtain department funds in support of their research. At the other extreme, most humanities and education alumni relied upon personal funds. Social scientists were more evenly distributed across the range of fund sources, but students in this division were the most heavily aided by university grants.

The question about source of research funds was not asked of the candidates, but faculty were queried about the chief source of funds for candidates. Fourteen percent answered that they didn't know, but the responses of the others are tabulated in Table V-8 as a surrogate for candidate response. Given the significant difference between faculty and student response on the subject of level of research costs this substitution is undoubtedly biased, but it is all that is available. To the extent that the faculty responses are valid, it appears that candidates rely less upon personal financing of their dissertations than alumni did in all divisions except education. Federal grants for social scientists also appear in reduced amount, but among life scientists and physical scientists federal grants seem to be even more important for candidates than they were for alumni. University grants, on the other hand, rose in importance for candidates in social science. Despite these apparent shifts within divisions the pattern among divisions remains essentially the same for candidates, as described by faculty, as it was for alumni.

Source of funding for alumni dissertation research was associated with the level of those research costs, as shown in Table V-9. Department and university funds were used largely for grants under $2000, over half of those sources supporting research under $1000. Similarly, personal funds supported mainly the lowest cost research, almost two thirds of those funds being expended on research under $1000. The federal government, on the other hand, played its most important role at the highest level of research cost; 39 percent of it went into research costing $5000 and over.

TABLE V-9

Alumni Research Costs by Source of Funds*

(percent at each cost level)

	Fund Source					
Dollars	Personal	Federal grant	Dept.	Univ. grant	Other grant	Other
Under 500	41	9	29	31	14	18
500-999	23	11	27	24	17	17
1,000-1,999	24	16	25	16	24	17
2,000-2,999	5	9	8	7	6	8
3,000-4,999	4	16	4	10	14	10
5,000 and over	3	39	6	12	24	31
N.	435	287	110	131	83	78

*Actual values differ significantly from expected values at .01 level on chi-square test.

The year in which alumni obtained the degree made no difference in the source of their research funding, but both sex and age did. As Table V-10 shows, almost twice as many women as men, proportionately,

TABLE V-10

Alumni Source of Funds to Defray Research Costs by Sex*

(percent using each source)

Fund source	Male	Female
Personal	34	57
Federal grant	28	18
Department	11	5
University grant	12	10
Other grant	8	4
Other	7	6

*Actual values differ significantly from expected values at .01 level on chi-square test.

relied upon personal funds to finance their dissertation research costs. Men were twice as likely to receive aid from departmental funds and substantially more likely to obtain federal grants. Only in the area of university grants was there parity between men and women. These differences are accounted for almost entirely by differences among the divisions. Department funds are most heavily utilized in physical science, where there were hardly any women; the divisions with the largest proportions of women, humanities and education, were also those where personal funds were most important for both sexes. Within all the divisions, except social science, sex differences were not significant at even the 5 percent level of confidence. In social science, which was significant at that level, twice as many men as women received department funds or federal grants and almost twice as many women (half the total) as men relied upon personal funds. Relatively more women than men received university grants, however.

Table V-11 shows firstly the distribution of fund source by age group. Clearly reliance upon personal funding increases directly with age, rising from 19 percent of 26-27 year olds to 64 percent of those 36 and older. The lower half of the table reveals more sharply the biases by age in the different kinds of fund source. Over half of federal and department funding went to alumni aged 26-30 when they received the degree, as did almost two thirds of the university grants. But the 24 percent of alumni who were 36 and older received only 9 or 10 percent of these grants. The oldest group of alumni received assistance commensurate with their numbers only from "other grants", while they comprised a

TABLE V-11

Alumni Source of Funds to Defray Research Costs by Age*

	Age group (percent using each source)					
Fund source	25 and under	26-27	28-30	31-32	33-35	36 and over
Personal	30	19	29	36	43	64
Federal grant	38	37	28	32	22	12
Department	14	13	13	11	8	4
University grant	9	14	18	11	10	5
Other grant	4	11	7	6	4	7
Other	5	5	6	4	13	9
N.	56	222	299	163	133	274

		Fund Source (percent in each age group)					
Age group	Total	Personal	Fed. grant	Dept.	Univ. grant	Other grant	Other
25 and under	5	4	7	7	4	2	4
26-27	19	10	28	25	23	31	15
28-30	26	20	28	33	40	26	22
31-32	14	13	17	16	14	12	8
33-35	12	13	10	10	10	7	21
36 and over	24	40	11	9	10	22	30
N.	1147	436	301	114	132	82	82

*Actual values differ significantly from expected values at .01 level on chi-square test.

disproportionate 40 percent of alumni depending upon personal funds, contrasted to an understated 10 percent of 26-27 year olds who were dependent upon that source. These relationships form a consistent pattern with the findings in Chapter III that the distribution of fellowship aid for personal support also tends to vary inversely with age.

Three comments were written about the financing of dissertation research. A candidate in Psychology declares that financial pressures push candidates into selecting a short topic; a colleague in Sociology suggests that a function of Rackham is to provide more money for dissertation research. A professor of Zoology, on the other hand, poses a more disquieting problem. He declares that an advisor should not be expected to find support for his students' research as this has resulted in the unethical use of funds, yet getting money from the department "is a degrading experience." He goes on to say that when a student is bound to a professor financially he tends to lose his academic freedom to investigate.

Publication of Dissertation Research

Publication of the dissertation is a controversial issue. Although it places near the bottom of the list of dissertation goals, it looms larger in the life of doctoral students and faculty than that low priority location would signify. This is illustrated by the substantial amount of commentary the subject generated on the survey, despite the opportunity to record quantitative judgements.

Faculty were asked to estimate the percentage of dissertation research that currently reaches publication. Their replies are shown in Table V-12. Overall the responses divide quite evenly among the five categories, but there are conspicuous differences by division. Two thirds of the faculty in life and physical sciences estimate that 60 percent or more of the dissertation research is published. In the other three divisions, by contrast, almost two thirds to well over three quarters of them estimate less than 40 percent of the dissertations reach publication.

TABLE V-12

Amount of Dissertation Research that Reaches Publication

(percent in each category)

			Division*			
Percent of Research	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
0 - 20	19	2	4	22	52	50
20 - 40	20	12	5	39	30	26
40 - 60	22	22	28	27	12	7
60 - 80	23	36	36	10	4	17
80 -100	16	28	27	2	3	0

*Actual values differ significantly from expected values at .01 level on chi-square test.

Alumni reports of publication experience show some interesting contrasts to the faculty estimates (Table V-13). Many more alumni in life and physical science report that their dissertation was not published than faculty estimates would indicate. A fifth of dissertations in these heavily publishing divisions were not published; most of those that were appeared in journal articles. This avenue of publication was the most common in the other three, less heavily publishing, divisions as well, but social scientists and humanists were much more likely to publish

TABLE V-13

Alumni Dissertation Publication*
(percent with each type)

Type of publication	Total			Division				
	All	Male	Female	Life Sci.	Phys. Sci.	Soc. Sci.	Human	Educ.
As one or more journal articles	48	50	38	69	64	48	29	26
As brief research report	5	5	3	5	10	2	2	6
As a monograph	8	8	7	6	4	11	9	11
As a full book	5	5	7	1	0	10	12	4
Not published	34	32	45	20	22	29	48	53

*Actual values differ significantly from expected values at .01 level on chi-square test.

their dissertations as monographs or books than their colleagues were. The differences between men and women in their dissertation publishing experience are statistically significant. Not only did fewer female alumni publish, but the biggest contrast occurred in the scholarly journals. With respect to book publication the proportion of women was larger, but this may reflect the large number of women in humanities.

All the respondents were asked whether they thought positive measures are needed in their departments to increase the probability that dissertation research reaches publication. Unfortunately, the faculty were not offered the same set of multiple choices as the alumni and candidates, so that direct comparison among respondent groups is not possible. Alumni and candidates were given the option of designating "publication is not a specific objective", which concept faculty may have included with "current system adequate".

As Table V-14 shows, overall about twice as many faculty as alumni and candidates answered "current system adequate". By division, however, there is great variation in the extent to which faculty satisfaction exceeds that of alumni and candidates. The differentials are largest in humanities and smallest in education. Education faculty are the least satisfied, physical science the most. Among alumni and candidates, the

TABLE V-14

Need for Measures to Increase Publication of Dissertation Research

(percent with each opinion)

		Division*				
	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Faculty						
Current system adequate	42	43	54	37	37	18
Yes, depending on measures	35	33	28	36	38	55
Yes	13	18	10	14	7	20
No opinion	10	6	8	13	18	7
Alumni						
Current system adequate	24	33	36	21	10	19
Publication not desired	30	21	26	31	36	37
Yes, depending on measures	22	21	17	21	26	23
Yes	12	16	7	13	16	12
No opinion	12	9	14	15	12	8
Candidates						
Current system adequate	20	28	40	13	12	14
Publication not desired	26	25	19	24	31	32
Yes, depending on measures	24	18	19	33	25	19
Yes	12	18	6	12	13	11
No opinion	18	11	15	18	19	25

*Actual values differ significantly from expected values at .01 level on chi-square test.

humanists are the most dissatisfied with the current system. But for about a third of them, as for similar proportions of education and social science students, publication is not an objective. Among life and physical scientists, on the other hand, for whom publication is more likely to be an objective, the current system is more likely to be considered adequate.

It is the two choices of "yes" response that are most directly comparable across respondent groups. Almost half the faculty answered "yes", most of them with qualifications, while about a third of the alumni and candidates so responded. It is interesting that on this question not many more candidates, relatively, than alumni and faculty declined to express an opinion, except in education.

Faculty are much more positive about the need for new measures, depending on the measures, than are the alumni and candidates. As expected, education faculty are the most anxious for new measures, physical science the least, while among alumni the humanists call most strongly for new measures, and among candidates the social scientists are the most emphatic. The three groups are much more alike in their response to an unqualified "yes", except that, relatively, about half as many faculty in humanities as alumni and candidates so responded, while in education many more of the faculty than students answered "yes". In short, faculty in all divisions are more interested in new measures to promote publication than their students and former students are, but they are especially so in education.

There does not seem to be a direct association, however, between the amount of dissertation research a division already publishes and faculty interest in taking positive measures to increase it. The education faculty, whose students show the lowest publication rates, is the most anxious to take positive measures. But the life science faculty, whose students are already publishing at the highest rate, are about as anxious to take positive measures as the social science faculty, where publication is presently not nearly as common.

Alumni and candidates were asked actually to suggest measures that could be taken to increase the probability of dissertation research reaching publication. Their responses, emanating mostly from life science, physical science and social science, ranged from "allow it" to "require it". In addition a substantial number of specific proposals were made from members of every division in response to the request for them.

Several people called for instructional aid. Alumni in Sociology, English, American Culture and Education, as well as a faculty member in Mathematics, want this to focus on editing techniques and how to select the appropriate journal for submission. Candidates in Biochemistry and Anthropology want formal lectures on how to write a journal article, while a colleague in History calls for "more concentration on basic English and good narrative style." An alumnus in American Culture proposes that students write articles for class assignment, which their peers would criticize before submission to a journal. Two candidates focus on the topic selection process. One in History believes that chances for publication might increase if the faculty "Insist on significant dissertation topics, backed by adequate research", while one in Education calls for the elimination of half-baked and trivial topics. Faculty interest in a student's publication as if it were his own would help, according to a Zoology candidate, while a graduate in that department wants the department to lean on chairmen who are co-authors and still don't get the paper out. There were other individual suggestions, such as the English alumnus who says that dissertations should be allowed that are stylistically more like articles and not so stiff and heavy as is customary, the Epidemiology candidate who suggests that dissertations research should be done in two or three stages, with each submitted as a journal article for committee review, followed by department provision of clerical and financial support for approved publications, and the candidate in Political Science who recommends "Get an agent".

The largest number of proposals for measures to increase publication relate to University sponsorship. A Botany professor finds it embarassing to have our theses published by other universities, and suggests that this university should provide financial support for publication series which have no budgeted funds. University series of occasional papers or abstracts are proposed by candidates in Botany, Anthropology, Social Psychology and Education, and an alumnus in Computer Science. A colleague in Economics who agrees, also proposes that a 6-month time limit after graduation be imposed. An alumnus in Sociology suggests treating students from the start as though they are capable of professional work and giving Ph.D.s the kind of push law students get from the Law Review. A graduate Chemical engineer proposes a University of Michigan sponsored research journal and/or school or university interdisciplinary symposia for oral presentation of dissertation research.

At one time Graduate School policy did not permit the inclusion of previously published material in the bound dissertation that is submitted in partial fulfillment of the degree requirements.* Faculty were asked to express an opinion of this policy, candidates were asked whether they expected it to hinder them in the publication of their research, and alumni were asked whether it had hindered them in any way. Looking first at alumni experience, shown in Table V-15, it is clear that virtually all of them encountered no problems as a result of this policy. Those few who did were most likely to be in life or physical science. Table V-16 shows that candidates are not nearly as optimistic on this subject as alumni experience warrants. 12 percent of them definitely expect difficulties in publishing their dissertation research as a result of this policy and almost a fourth believe they might encounter such difficulty. Candidates in life and physical sciences, the most heavily publishing divisions, are the most pessimistic.

TABLE V-15

Alumni Problems Resulting from Policy Against Previous Publication of Dissertation Material
(percent)

		Division*				
	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
No	95	94	95	97	96	96
Yes, not serious	4	4	5	3	4	4
Serious inconvenience	1	2	1	0	0	0

*Actual values differ significantly from expected values at .05 level on chi-square test.

Faculty opinion was asked in terms of three types of publication policy: prohibition of previously published material; permission of previously published work, but with controls to ensure that the work was done as part of the student's doctoral training; and permission of published work unless the committee agrees that its inclusion in the disser-

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*The Graduate School imposes no restrictions with respect to copyright on its own. The copyright issue is a complicated one, and the relevant section of the Handbook for Doctoral Candidates (Section 10, page 34) is essentially exegetic and advisory.

TABLE V-16

Candidates' Expectations of Problems Resulting from Policy Against Previous Publication of Dissertation Material
(percent)

		Division*				
	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
No	66	53	59	73	70	65
Perhaps	23	27	24	18	23	27
Yes	12	21	17	9	7	8

*Actual values differ significantly from expected values at .01 level on chi-square test.

tation would be inappropriate. Table V-17 reveals that an overwhelming 83 percent majority of the faculty believes that previously published material should be permitted in the dissertation under qualified conditions. Slightly more of them prefer the second alternative to the third. Life and physical science faculty are considerably more supportive of permitting previously published material than are members of the other three divisions, but they favor more strongly controls to ensure that it is part of doctoral training. About a fifth of the social science and humanities faculty would continue to prohibit the inclusion of previously published material, as would 29 percent of the education faculty. Among the substantial majorities of those divisions who favor permission there is no clear choice for either of the permissive alternatives.

TABLE V-17

Faculty Opinion About Publication Policy
(percent)

		Division*				
	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Prohibit previous publications	17	11	14	22	20	29
Permit with controls	44	55	47	34	38	36
Permit unless committee denies	39	34	39	44	42	36

*Actual values differ significantly from expected values at .01 level on chi-square test.

Alumni are somewhat doubtful about changing current policy -- one fourth of them answered "no" -- but candidates are as emphatic as faculty for change, divided about equally between those who definitely favor a change and those who answered "perhaps" (Table V-18). Consistency in outlook is shown by the educators in all three respondent groups, who are least favorable to a change in this policy. Among alumni, social scientists display the strongest support for change, followed very closely by the life scientists, who are the most supportive of change among both candidates and faculty.

TABLE V-18

Opinion on Changing Publication Policy

(percent)

		Division*				
Alumni	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
No	25	24	27	18	24	36
Perhaps	46	42	40	51	50	51
Yes	29	34	33	31	27	13
Candidates						
No	13	10	13	11	14	18
Perhaps	46	31	42	46	53	57
Yes	42	59	45	43	33	25

*Actual values differ significantly from expected values at .01 level on chi-square test.

Permission to include previously published material in the dissertation appears to be widely supported by all respondents. Yet when asked whether they would favor more flexible format standards for the dissertation, such as two to four substantial journal articles in place of the current model, a very different pattern of response emerges. The faculty appears to be more conservative and their views are very far apart from the candidates, with alumni opinion falling quite close to the faculty (Table V-19). Thirty-eight percent of the faculty answered an unqualified "no" to changing the format of the dissertation, although almost another third answered "yes", with or without qualification. Among candidates, on the other hand, 56 percent call for more flexibility.

TABLE V-19

Opinion on More Flexible Format Standards
(percent with each opinion)

		Division*				
Faculty	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
No	38	31	39	37	45	41
Perhaps	28	26	29	23	31	37
Yes	16	18	18	20	9	7
Yes, plus other changes	15	22	9	17	14	11
No opinion	3	3	5	3	1	4
Alumni						
No	30	23	29	27	27	45
Perhaps	29	28	28	29	36	25
Yes	17	27	16	17	14	10
Yes, plus other changes	16	18	14	21	16	13
No opinion	8	5	13	6	7	7
Candidates						
No	17	9	23	16	17	18
Perhaps	21	21	23	20	23	18
Yes	22	36	17	21	18	18
Yes, plus other changes	34	29	26	39	36	38
No opinion	6	5	11	4	6	8

*Actual values differ significantly from expected values at .01 level on chi-square test.

These differences prevail through all the divisions but are most marked in humanities and education, where the faculty is most strongly opposed to alteration. In life science and social science, on the other hand, where 60 percent or more of the candidates answered "yes", the largest proportions of faculty also concurred, although two to three times as many faculty as candidates answered "no" in those divisions. Faculty and candidates are in closest agreement in physical science, where candidates are least enthusiastic about alterations in the format and faculty take a more middle position. Alumni are most supportive of change in life science, a heavily publishing division, and least favorable in education where fewest dissertations are published. Thus, the divisional responses on this question are quite consistent with previously discussed questions, even while the respondent groups diverge in the manner shown.

The extent of commentary on this issue of flexible format does not quite match up with the emphasis found in the quantitive responses. Faculty, who seem to be somewhat ambivalent about the role of publication during the dissertation process, had very little to say about these matters in their remarks. Those who did comment are all in life and physical science and strongly support publication before completion of the dissertation. Professors in Botany, Pathology, and Physiology suggest that the dissertation should consist of a set of publishable papers together with a brief integrating review of the literature and summary of findings. Another Botany professor believes that students should publish at least one paper before completing the dissertation in order to acquire the experience of real professional writing. A colleague in Physiology declares that the dissertation should be published in a good journal, but most theses are now too long or not good enough. A Mathematics professor, on the other hand, feels that acceptability in a journal should be a major criterion and "all the junk about margins and so forth ... discarded." A Mechanical Engineering professor sees the merit in published papers as their usefulness, in contrast to dust-gathering shelved dissertations.

Alumni comments are almost evenly divided in number between those favoring greater flexibility in publication and those opposing. Alumni in several life science fields believe that the prospect of publication in a good journal will elicit a higher quality dissertation than the conventional format. Three sociologists agree that acceptability in an appropriate journal is itself evidence of accomplishment, and a psychologist suggests that doctoral training should approximate real professional life -- if research is good publish it, if not don't. Among alumni in several fields who troubled to state their approval of journal publication, one physicist said that only one journal article should be allowed because more would lead to mostly useless proliferation, while two humanities alumni declared that no fewer than three solid articles should be permitted to fulfill the requirement.

More alumni expressed strong opposition to allowing the use of journal articles as partial fulfillment or an alternative thesis form than any other group. Mainly they are concerned about the erosion of standards, which ought, in fact, to be raised. Several, from fields as disparate as English and Engineering, emphasized that a long, deep, complex research project is the most important benefit of graduate school. A Geography alumnus points out that the dissertation may be the only scholarly piece of work a student does, and a proposal like the one in the questionnaire could turn "Rackham Grad college [sic] into a College of Education!" A Psychology alumnus speaks for the concern several people expressed about the Universtiy relegating to others its responsibility to judge quality when he said "Mich. is conferring the degree -- not some journal!!" A Biochemistry graduate fears that the Chairman may play too big a role in the journal article format in order to reap the benefits of reflected glory, while a Chemical Engineer feels there is too much emphasis placed on publication, that two or three articles get published where only one is justified.

This last argument is the major one presented by candidates who oppose the introduction of a more flexible format. Professors "seem to be obsessed with publishing papers ... when a bit of trivia is unearthed, their first thought is to publish it", according to one Mathematics candidate. Candidates in Electrical Engineering and Education say the same thing less politely. A student in Far Eastern Languages and Literature proposes as a solution to the over-publication problem that universities make a pact that no dissertation be expanded to a book, but a good one might be condensed to a meaningful monograph; "There must be a stop to this flood of meretricious publications." Candidates, too, recognize the disadvantage of the relatively narrow scope of journal articles as contrasted to a full scale in-depth dissertation. Opposition to the proposal on these grounds was registered by students in Physics, History, Philosophy and English.

Several candidates in the life and physical sciences are ambivalent about this question. As one in Zoology pointed out, getting a job depends so much on publication that thesis work should be published as soon as possible, even if the dissertation is not finished; substitution is a good idea, but the dissertation should remain an option because "you can put lots of ideas in it which are not publishable." A Chemistry candidate also speaks to the desirability of being able to express ideas in a dissertation that are not otherwise publishable because of lack of conclusive evidence, but which may lead to future research. He concludes that the policy should be changed, however, because prospective employers ask about publications.

Indeed the great majority of candidates who commented on this issue favor the kind of flexible format suggested in the questionnaire. A computer scientist asks, "Why in blazes do you have this policy ... it discourages publishing!!!" Most people would not go so far as two Education candidates, however: one suggests "waiving the requirement on the basis of previous work or performance"; another believes that more journalistic style should be allowed, including value judgements and subjective statements if they are clearly labeled. A student in Human Genetics speaks for others in several fields when he points out that writing papers for publication is valuable because most Ph.D. candidates don't know how to do it and it provides a basis for peer evaluation. A student in Romance Languages observes that it is so hard to get a book published that a student is wise to develop research and presentation skills for the shorter format. An Epidemiology candidate not only agrees that the journal article is the "most important tool in the scientific peer review system", but asserts further that dissertations are rarely read.

Frustration over the burial of dissertations was expressed by several respondents. Students in Psychology and Mechanical Engineering observed that dissertations are not readily available to others, and if they are they are too long, while "journal articles demonstrate competence and get the information out." An English candidate admits that he hesitates to put too much energy into a dissertation because not many people will read it, whereas he would have a stronger incentive to write a series of relevant articles. A student in Romance Languages is poignantly discouraged that his dissertation will be read only by his committee and his wife; if candidates knew their dissertations would circulate, he says, they would probably write better ones.

Journal publication relates strongly to goals for the dissertation for several people. One candidate in Political Science stated simply that this goal is to publish a brief journal article rather than a 300-400 page study, while candidates in Zoology and Economics point out that all the meaningful goals can be better fulfilled by a few less extensive research papers in several areas of discipline, published or accepted for publication.

Summary

Most doctoral students choose their own dissertation topics, but a third of the life and physical scientists pursue topics proposed or assigned by the chairman. The importance of research funds in determining topic is much more important to life and physical science students than to the others. These are the divisions in which dissertation research is most costly, and where it is most likely to be supported by federal grants. The least costly research is found in humanities, financed mainly by personal funds. Male alumni were likely to spend more than female and to obtain aid from department funds or federal grants, which were also more likely to go to younger students; older alumni relied more heavily upon personal financing.

With respect to dissertation procedures, greatest satisfaction is registered for those dealing with format of the dissertation and the final oral examination. Nevertheless, a large minority demand that the trivial and detailed format regulations be abolished and that the oral be timed more opportunely for final changes in the dissertation. Respondents in all three groups are less satisfied with the prospectus stage and with the general understanding (or lack thereof) of standards for dissertation content and quality. Many call for greater diversity in dissertation form, content and presentation, while quality is rigorously maintained and enhanced.

Publication is a controversial issue. Faculty tend to overestimate the amount of dissertation research that is, in fact, published, and feel more strongly than their students about the need for positive measures to increase publication, especially in education. Although faculty overwhelmingly favor permission to include previously published material under qualified conditions, especially in life and physical science, there is much less enthusiasm for changing the format of the dissertation to allow submission of one or more journal articles in fulfillment of the requirement. Over a third of the faculty and almost as many alumni oppose this suggestion, especially in humanities and education, while a majority of candidates endorse it.

VI

STUDENT-FACULTY RELATIONSHIPS

There is a broad consensus that the most important single component of doctoral study is the relationship between the candidate and his or her chairman and committee. This chapter examines the process of selecting the chairman, the type of supervision he exercises and the student's satisfaction with it, the selection and composition of the doctoral committee, the nature of the student's interaction with it, and the importance of informal student-faculty interactions.

Relations with the Chairman

Selection of the dissertation chairman is one of the critical events in the life of a Ph.D. candidate and, as Table VI-1 shows, most respondents consider it a joint decision between the student and the individual who, in fact, becomes the chairman. When the distributions are arrayed by respondent group, however, some interesting differences in perception show up. A significantly higher proportion of faculty members see the decision as a joint one than do either alumni or candidates. The difference is accounted for largely by the much higher

TABLE VI-1

Method of Selecting Dissertation Chairman*
(percent using each method)

	Faculty	Alumni	Candidates
Chairman invites	1	11	8
Joint decision	87	69	70
Dept. committee	2	3	2
Other	4	14	16
Origin unclear	6	4	5

*Actual values differ significantly from expected values at .01 level on chi-square test.

proportions of alumni and candidates who respond "other" than faculty who answer that way. Inspection of the questionnaires indicates that the most frequent "other" response is defined as student selection of the chairman, an alternative that was not included among the multiple choices offered. Another frequently encountered "other" basis is the chairman's unique position as a specialist in the chosen area of research, followed in frequency by previous association between the student and chairman.

Eight and 11 percent, respectively, of the alumni and candidates perceived that the chairman had invited them to write their dissertations under his or her supervision, but only one percent of the faculty was under this impression. It appears, then, that the statistically significant differences between faculty and their students or former students on the question of how the chairman is selected is largely a semantic one -- a question of who invited whom, resolved by the faculty as a mutual admiration. Moreover, this difference in perception seems to be indigenous; it prevails throughout the divisions.

Faculty, alumni and candidates agree that some 60 percent of dissertation chairmen exercise either moderate supervision evenly throughout the process or place supervisory emphasis at the initial and final stages of the dissertation while keeping in touch throughout (see Table VI-2). But beyond that faculty description of their supervisory policies differs quite sharply from the perception of their current and former candidates. None of the faculty report that they supervise only the final stages of the dissertation, but six percent of the alumni and candidates answer that they did. Seven faculty members (one percent) report that they supervise at the initial and final stages, but 10-12 percent of the candidates and alumni consider that they have been supervised only at these stages. Some 16-18 percent of students and former students, then, believe that they have received far less supervision from their dissertation chairmen than the chairmen believe they have provided. Furthermore, almost all of the candidates who respond "other" on this question describe the supervision as minimal, sporadic, inconsistent, provided only at student request and so on.

TABLE VI-2

Pattern of Chairman's Supervision

(percent reporting each pattern)

		Division*				
Faculty	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Final stages only	0	0	0	0	0	0
Init. & fin. stages	1	1	1	3	1	0
Thruout, emphasis init. & fin.	33	42	27	42	20	39
Moderate thruout	28	28	33	20	35	17
Moderately heavy thruout	26	18	27	24	31	37
Very heavy thruout	7	5	10	5	9	5
Other	5	7	2	6	4	2
Alumni						
Final stages only	6	4	6	7	6	3
Init. & fin. stages	12	15	14	17	10	16
Thruout, emphasis init. & fin.	25	19	20	31	20	37
Moderat thruout	35	41	44	25	36	27
Moderately heavy thruout	12	9	8	10	17	17
Very heavy thruout	4	1	1	4	7	6
Other	6	10	7	6	4	4
Candidates						
Final stages only	6	8	8	7	6	1
Init. & fin. stages	10	7	4	12	11	14
Thruout, emphasis init. & fin.	20	14	17	25	15	32
Moderate thruout	41	45	50	37	44	31
Moderately heavy thruout	8	10	11	4	10	6
Very heavy thruout	3	5	0	3	2	5
Other	12	11	11	12	13	12

*Actual values differ significantly from expected values at .01 level on chi-square test.

Even among the 60 percent of all groups who characterize the supervision in the "middle ranges", there are significant differences. And when it comes to extensive supervision the faculty believe that they provide it in moderately heavy doses throughout the process to a far greater extent than their students do -- 26 percent, contrasted to 8 and 12 percent. There is somewhat less disparity among the respondents on the pattern of very heavy supervision throughout.

These differences in perception are found throughout the divisions, but humanities and education diverge from the remainder in certain features.

Faculty and alumni in humanities report virtually identical percentages of chairmen who supervise moderately throughout, or who place emphasis at initial and final stages. Furthermore, the humanities faculty are significantly different from their colleagues in other divisions in these proportions. In education faculty, candidates and alumni depart from their cohorts in other divisions in that all agree fairly closely on the proportions of chairmen who place emphasis at initial and final stages. Faculty in that division, on the other hand, report that they supervise at moderate levels throughout in much smaller proportion than their colleagues in other disciplines, and substantially more of them report supervising at moderately heavy levels throughout. Finally, education candidates and alumni, unlike their cohorts in other divisions, rarely report that they are or were supervised at the final stages only.

Despite these differences in perception, the great majority of alumni and candidates have been satisfied with their relationships with their chairman (see Table VI-3). Indeed, among alumni a higher proportion

TABLE VI-3

Student Satisfaction with Chairman's Supervision

(percent at each level)

		Division				
Alumni*	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Very dissatisfied	6	5	6	4	6	8
Dissatisfied	8	9	7	7	9	6
Neutral	10	13	13	9	9	6
Satisfied	35	40	41	36	30	27
Very satisfied	41	33	32	44	46	53
Candidates						
Very dissatisfied	5	8	3	5	4	6
Dissatisfied	11	14	12	11	10	8
Neutral	15	14	17	13	16	14
Satisfied	37	33	35	41	35	38
Very satisfied	32	32	33	29	35	34

*Actual values differ significantly from expected values at .01 level on chi-square test.

were "very satisfied" than were merely "satisfied". But these good feelings vary significantly by division. Whereas a third of life science and physical science alumni were very satisfied, that proportion rises through the remaining divisions to a high of 53 percent in education. But when the category "satisfied" is added the combined percentages vary little over the divisions. Although education has the highest proportion of very satisfied alumni, it also has the highest proportion of very dissatisfied people. Again, when "dissatisfied" is added the variation is greatly reduced. Candidates' sense of satisfaction about the chairman's supervision is much more consistent than alumni; for them there is no significant difference among divisions.

Sex is not relevant for either student group, and year of graduation made no significant difference for alumni, but the degree of satisfaction they felt with respect to their relationship with the chairman was significantly associated with the type of supervision he exercised, as shown in Table VI-4. The most dissatisfied alumni are fairly evenly distributed through five of the seven types of supervision, but they are disproportionately concentrated at "final stages only". A similar fifth of the "dissatisfied" alumni were supervised at final stages only, but the largest number of them were supervised at both initial and final stages. Looking at the lower half of the table, alumni who were supervised at the final stages only distribute quite evenly through the levels of satisfaction, although this group displays the largest proportion of very dissatisfied students. Even though the largest proportion of dissatisfied alumni were supervised at initial and final stages only, over half of the alumni who had that kind of supervision were, in fact, satisfied or very satisfied, and a fifth were neutral.

At the other end of the spectrum, about two thirds of the satisfied and very satisfied alumni had their dissertations supervised either moderately throughout, the most popular pattern, or throughout with emphasis on initial and final stages, and another 18 percent of the most satisfied were supervised moderatley heavily throughout. In looking at these three patterns in the lower half of the table it is clear that

TABLE VI-4

Alumni Satisfaction with Supervision by Pattern of Supervision*

Pattern of Supervision	Total	Level of Satisfaction (percent in each pattern)				
		Very Dissat.	Dissat.	Neutr.	Satis.	Very Satis.
Final Stages Only	6	19	19	13	4	2
Initial and Final	12	13	28	25	12	6
Thruout, Emphasis Init.&Final	25	19	17	20	30	25
Moderate Thruout	35	25	14	30	39	38
Moderately Heavy Thruout	12	7	3	1	10	18
Very Heavy Thruout	4	4	1	0	2	7
Other	6	13	17	11	3	3
N.	1228	69	92	130	437	500

Level of Satisfaction	Total	Pattern of Supervision (percent at each level)						
		Final Only	Init. &Fin.	Thru, I&F	Mod Thru	Mod Heavy Thru	Very Heavy	Other
Very Dissatisfied	6	18	6	4	4	4	7	12
Dissatisfied	8	24	17	5	3	2	2	22
Neutral	10	24	21	8	9	1	0	21
Satisfied	35	23	35	42	40	29	17	19
Very Satisfied	41	11	21	40	44	64	74	26
N.	1228	71	152	311	432	143	46	73

*Actual values differ significantly from expected values at .01 level on chi-square test.

almost all of the alumni in those categories were satisfied or very satisfied. And of those who supervision was very heavy throughout, three quarters were very satisfied. In short, the more closely a doctoral student is supervised the more satisfied he is in his relations with the chairman.

Candidates' responses support this conclusion (Table VI-5). Over half of the very dissatisfied candidates indicate some "other" pattern of supervision than the ones offered on the questionnaire, but a disproportionate two fifths of the dissatisfied candidates report their supervision at final stages only or at initial and final stages. Moreover, a fifth to a third of the candidates receiving that kind of supervision are dissatisfied. Satisfied and very satisfied candidates, like alumni,

TABLE VI-5

Candidate Satisfaction with Supervision by Pattern of Supervision*

Level of Satisfaction
(percent in each pattern)

Pattern of Supervision	Total	Very dissat.	Dissat.	Neutral	Satis.	Very satis.
Final Stages Only	6	6	19	9	5	3
Initial & Final	10	9	19	17	8	5
Thruout, Emphasis I & F	20	11	9	25	24	20
Moderate Thruout	42	11	25	29	49	49
Moderately Heavy Thru.	8	0	1	2	7	14
Very Heavy Thruout	3	6	6	1	1	4
Other	11	57	20	17	6	5
N.	726	35	79	105	270	237

Pattern of Supervision
(percent at each level)

Level of Satisfaction	Total	Final Only	Init. & fin.	Thru., Emph. I&F	Mod Thru	Mod Heavy Thru	Very Heavy Thru	Other
Very Dissatisfied	5	4	4	3	1	0	10	24
Dissatisfied	11	32	22	5	7	2	25	19
Neutral	14	19	26	17	10	4	5	22
Satisfied	37	28	32	44	43	36	10	21
Very Satisfied	33	17	16	31	38	59	50	14
N.	726	47	69	149	302	56	20	83

*Actual values differ significantly from expected values at .01 level on chi-square test.

are found mostly in the supervision categories of moderate throughout or throughout, but with emphasis on initial and final stages, and those with more supervision are consistently happier than those with less. These relationships of preference to experience prevail quite consistently throughout the divisions for both candidates and alumni.

Dissatisfied alumni and candidates were asked to identify which of eight suggested reasons explain their dissatisfaction. Table VI-6 shows these factors listed in the order in which they were selected by the largest numbers of respondents. A respondent was not limited in

TABLE VI-6

Factors Contributing to Student Dissatisfaction with Chairman
(percent reporting each factor)

Rank Order	Dissatisfaction Factor	Total	Division* Life Sci	Phys Sci	Soc Sci	Human	Educ.
Alumni							
1	Insufficient Time	64	67 (2)	68	57	69	60 (3)
2	Expectations Unclear	62	58 (3)	58 (3)	52	66	83 (1)
3	Not Stimulating	58	71 (1)	62 (2)	47	60	57 (4)
4	Attitude Not Helpful	46	46 (6)	40	38	59	56 (5)
5	Didn't Know my Research Area	43	54 (4)	38	27 (6)	47 (6)	61 (2)
6	Delayed Reading	42	48 (5)	32	36 (5)	53 (5)	40
7	Attitude Threatening	17	8 (8)	9 (8)	11	32	26
8	Standards Unrealistic	14	12 (7)	11 (7)	6	21	20
	Other	74	89	62	75	75	73
	N	176	25	57	35	35	24
Candidates							
1	Expectations Unclear	64	76	52 (2)	60 (2)	74	62
2	Insufficient Time	62	55	67 (1)	66 (1)	59	57
3	Attitude Not Helpful	51	54	45 (4)	51	54	46 (4)
4	Not Stimulating	41	32 (5)	47 (3)	42	46	31
5	Doesn't Know My Research Area	38	36 (4)	44	36 (6)	42	31
6	Delayed Reading	37	32	36	42 (5)	27 (7)	53 (3)
7	Standards Unrealistic	25	32	20 (8)	22	36 (6)	14
8	Attitude Threatening	20	21	27 (7)	16	24	7
	Other	58	42	57	56	73	67
	N	156	29	33	53	27	14

*Where the rank order for a division differs from the total group the division rank is shown in parentheses.

the number of reasons he or she might check. Insufficient time given by the chairman to the student, ambiguity of his expectations and insufficient stimulation on the part of the chairman were the three most important reasons for dissatisfaction chosen by the alumni answering the question. There are only a couple of interesting divisional exceptions to this ordering. For the life scientists "Not stimulating" was the most frequently chosen reason, selected by almost three fourths of those answering, while for educators "expectations unclear" was the most important, selected by a very large 83 percent.

In the middle group of factors, chosen by 42 to 46 percent of the alumni, the most important divisional variant is the 61 percent of educators who claim that the chairman didn't know their research area and ranked that reason second in importance. The divisions are all pretty well agreed on the least important factors, a threatening attitude and unrealistic standards, but it is perhaps noteworthy that a fifth to a third of the humanities and education alumni identify these reasons, contrasted to only 6 to 12 percent of the respondents in the other divisions.

Candidates ranked the factors causing dissatisfaction similarly to the alumni, except that for the current students "unclear expectations" ranks ahead of "insufficient time" in all divisions but physical and social science. Divisional variation among candidates, although statistically significant, is less striking than it is for alumni. The major departure from the total group pattern is the 53 percent of education candidates who report that their chairman has delayed reading the dissertation, placing this reason in third rather than sixth place.

Three fourths of responding alumni indicated "other" reasons for dissatisfaction with their chairmen, but only 25 of them (one fifth) identified those reasons. In several cases they restated choices that appeared on the questionniare, but of the 22 truly "other" answers 13 related to inadequate or uninterested supervision; two of those said style, rather than content, of the dissertation was criticized. Another five complained the chairman was often unavailable because of other committments and absence, and four offered various individual grievances. Similarly, most of the candidates who specified "other" referred to inaccessibility of the chairman, his lack of interest, or insufficient guidance.

Despite some elements of dissatisfaction the overwhelming majority of students get on well with their chairman (Table VI-7). Two thirds or more have experienced no conflict, while another fourth report occasional, but not serious, conflict. This pattern prevails quite consistently among the divisions, with education apparently enjoying the greatest harmony. The six percent or so of alumni and candidates who report conflicts were asked to specify their nature and describe how

TABLE VI-7

Student Conflicts with Chairman

(percent at each level)

Level of conflict				Division*		
Alumni	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
No	69	65	71	67	68	76
Occasionally, not serious	25	27	24	29	24	19
Yes	4	5	3	3	6	3
Yes, serious	2	3	2	0	2	2
Candidates						
No	66	59	63	69	68	72
Occasionally, not serious	26	32	30	26	23	20
Yes	5	5	4	4	7	7
Yes, serious	2	3	3	1	2	1

*Actual values differ significantly from expected values at .01 level on chi-square test.

they were resolved. A majority of those responding to the question indicated that most conflicts are technical ones relating to the research and are usually resolved when the student accedes to the wishes of the chairman, with or without extended argumentation. A considerable number of alumni, however, indicates that conflict, or lack of understanding, was so severe that they felt obliged to change chairmen; that solution generally proved satisfactory.

Most of the commentary about chairman-student relationships was unsolicited and appears in the general remarks at the end of the questionnaire. Furthermore, it tends to be a commendation of the student's chairman, which defines his attributes. This is illustrated by the History candiate who finds that his "chairman has been thoughtful, flexible and extremely helpful [so] it is impossible for me to develop a negative attitude with his enthusiastic support ... the real key to the program." Similarly, a candidate in Political Science appreciates the fact that his chairman "did not view himself in an adversary relationship with me, but as a friend and aid. I always felt comfortable showing him my weakest material in order to get constructive comments on how to improve it." Alumni in Speech and in History indicate that the great respect they feel for The University of Michigan is based upon their experience with exceptionally fine chairmen, and an Education alumnus recalls his gratitude toward his chairman and department for their flexible attitude and non-interference in his self-defined program.

On the other hand, there are those for whom the chairman represents a bad experience -- the Educational Psychologist who says that his efforts to get together with the professor were more of a challenge than the dissertation itself, and the Art Historian who observes that the department was excellent, but the dissertation experience was bad because of the chairman. An Economics candidate rather wistfully observes that so much rides on the quality of the chairman, yet a professor who specializes in one's chosen field may not have good chairman qualities. A colleague in Chemistry offers a possible solution to this problem by suggesting that opportunities be arranged for students to work with several potential chairmen for short periods in order to test compatability. A graduate Psychologist in calling for more interaction between the advisor and the student suggests that the dissertation should be a cooperative effort. Only one faculty member made a specific comment on this subject, a professor or Orthinolaryncology, who believes that a close working relationship between student and advisor is an essential element of the doctoral program.

The general satisfaction both students and faculty feel about the procedures for selecting chairmen and committees and the supervision the chairman exercises is further illustrated by evaluations of these procedures on a four point scale (Table VI-8). Substantial majorities rate these procedures adequate to good, although the candidates, as usual, are somewhat less enthusiastic than the others. Approval is stronger for the selection procedures than for the supervisory relationship; in the latter case a third of the students and former students call for improvement or revision.

TABLE VI-8

Evaluation of Relationships with Chairman and Committee*

(percent with each opinion)

	Evaluation				
Selection procedures	Good	Adequate	Could be improved	Needs revision	No opinion
Faculty	28	44	20	5	3
Alumni	29	41	16	5	9
Candidates	24	37	21	6	12
Supervisory relationships					
Faculty	20	49	23	4	3
Alumni	26	34	24	7	9
Candidates	16	34	27	9	14

*Actual values differ significantly from expected values at .01 level on chi-square test.

Relations with Doctoral Committee

A similar difference in perception between faculty and the others shows up on the question of how members of the doctoral committee are chosen as appeared on the question of how the chairman is selected (Table VI-9). In this case, too, the majority of "other" responses relate

TABLE VI-9

Method of Selecting Doctoral Committee Members*

(percent using each method)

	Faculty	Alumni	Candidates
Chairman selected	1	4	4
Joint decision	90	76	74
Dept. chairman selected	1	2	0
Dept. committee assigned	1	2	1
Other	4	12	20
Origin unclear	3	3	1

*Actual values differ significantly from expected values at .01 level on chi-square test.

to student selection.

The survey then inquired how many members, including the chairman, the respondents thought there ought to be on each committee. As Table VI-10 shows, a little less than half of them consider four the optimal committee size, while another third prefers three. But on this subject all three respondent groups differed significantly from one another.

TABLE VI-10

Optimal Number of Dissertation Committee Members*

(percent choosing each number)

Number of Members	Faculty	Alumni	Candidates
One or two	1	3	4
Three	22	36	44
Four	57	46	44
Five or six	20	15	8

*Actual values differ significantly from expected values at .01 level on chi-square test.

Although there is clustering at four in each group faculty tend to prefer somewhat larger committees, while more candiates and alumni opt for smaller ones. By and large these differences prevail throughout the divisions. Faculty in social sciences and humanities however, differ from their colleagues in the other three divisions in that they register their second choices at smaller committees of three rather than larger ones of five or six (see Appendix Table VI-1).

Candidates and alumni were asked whether supervision of their dissertations would be (have been) improved by the presence on their committee of a non-university professional in the field. Minorities of a third of the alumni and 44 percent of the candidates answered "yes" or "possibly", but the responses to this question do not reveal a very strong desire in either group for the presence of such an "independent" committee member (Table VI-11). Among alumni social scientists and humanists are least interested in a non-university committee member, while physical scientists and educators are most approving. The same divisional contrasts are found among candiates, but in that group the social scientists are more supportive.

TABLE VI-11

Desirability of a Non-University Professional on Doctoral Committee

(percent answering at each level)

		Division*				
Alumni	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
No	52	51	40	60	60	52
Possibly	25	28	30	23	16	27
Yes	12	11	15	8	10	15
No opinion	11	10	15	10	14	6
Candiates						
No	42	37	32	47	52	32
Possibly	29	30	34	25	26	39
Yes	15	17	21	14	8	15
No opinion	14	16	13	14	15	14

*Actual values differ significantly from expected values at .01 level on chi-square test.

This proposal was tested at another place in the questionnaire where respondents were asked to indicate the extent of their agreement or disagreement with a series of statements about doctoral study. One of these declared that greater involvement of non-academic professionals in the program is desirable. A fourth to a third of the respondents registered no opinion on this question, but of those who did express themselves only a fourth of the faculty and alumni agreed with it at all, as did a third of the candidates (Table VI-12). As expected, the proposition is most clearly favored by physical scientists in all respondent groups, and most strongly disapproved by humanists. One Engineering alumnus went so far in the commentary at the end of the questionnaire as to suggest that a non-academic presence on the committee should be mandatory so as to introduce realism.

Faculty and student perceptions about the kind of interaction that takes place between the candidate and his or her full committee differ in much the same way as they do about the extent of the chairman's supervision. More than twice as many alumni and candidates as faculty report that the committee interacts at the prospectus and oral only or at dissertation completion only (Table VI-13). A significantly

TABLE VI-12

Greater Involvement of Non-Academic Professionals is Desirable*

(percent with each opinion)

		Division				
Faculty	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Strongly agree	6	7	8	5	5	7
Agree	19	19	24	17	13	24
Disagree	28	31	28	26	25	30
Strongly disagree	23	21	18	29	31	11
No opinion	24	22	23	23	27	28
Alumni						
Strongly agree	5	3	7	3	4	9
Agree	20	19	31	14	11	19
Disagree	28	30	23	33	30	28
Strongly disagree	18	14	10	24	26	18
No opinion	29	34	29	26	29	27
Candidates						
Strongly agree	8	12	8	7	4	10
Agree	28	28	40	27	20	31
Disagree	21	22	16	20	25	24
Strongly disagree	10	6	3	10	18	5
No opinion	33	32	33	36	33	30

*Actual values differ significantly from expected values at .01 level on chi-square test.

higher proportion of faculty, on the other hand, believes that the committee interacts at significant junctures. Yet all three groups are pretty well-agreed that close to half of all students interact with the whole committee only once or twice, but they do so frequently with one or two individual members.

There is little similarity between how these interactions actually occur and what the respondents think ought to happen. (Specifically they were asked which interaction pattern do they consider most beneficial to the student.) Although faculty continue to differ from alumni and

TABLE VI-13

Pattern of Interaction Between Student and Committee, As it is (was) and as it Ought to Be*
(percent reporting each kind of contact)

	As is	As should be	As is	As should be	As is	As should be
Dss. completion only	11	2	24	8	19	5
Prospectus & oral only	5	1	17	4	11	3
At sig. junctures	31	50	14	37	19	39
Once or twice, but freq. interaction w/ 1 or 2 mem.	50	36	45	42	48	43
Once a term or year	3	11	0	9	2	11

*Actual values differ significantly from expected values at .01 level on chi-square test.

candidates to a statistically significant degree, the disparity is considerably smaller when they are defining the most desirable relationship than when they are describing the status quo. Much larger proportions of each group believe that the interaction should occur at significant junctures in the dissertation process than report it occurs that way now, while slightly smaller proportions prefer meeting once or twice with frequent individual interactions than report that experience.

Faculty-student differences prevail throughout the divisions on these two questions, as they do on the subject of the chairman's supervision, but on interaction with the committee there are some significant divisional differences within the groups as well (Appendix Table VI-2). All three groups in life sciences and education report proportionally far fewer cases where the student-committee interaction occurs only at completion of the dissertation than did the other three divisions. Education faculty and candidates, on the other hand, report a considerably higher proportion than the other divisions of cases where the contact occurs at the prospectus and oral stages only, although the alumni in that field do not differ so much from the other alumni. The faculty in life sciences observe a significantly higher proportion of contacts at significant junctures in their division than did the others, and the faculty in social science report a considerably higher proportion of "once or twice, but frequent interaction with one or two members" than their colleagues in other divisions.

With regard to the most desirable pattern of interaction alumni and candidates in education are considerably more enthusiastic than anybody else about contact at prospectus and oral only. Alumni and candidates in physical sciences are out of step with their cohorts on the desirability of interaction at significant junctures, in that fewer of them prefer this. And only life and physical scientists show approval for interaction once a term or year.

Does a respondent's experience with one or another of these interaction patterns influence his or her thinking with regard to which is the most beneficial pattern? Table VI-14 shows the expressions of the most desirable pattern tabulated by the respondent's report of his experience. The diagonals show the percentage of respondents reporting each experienced pattern who also consider that one the most desirable (the raw data are shown in Appendix Table VI-3). Clearly, there is only one real winner among all three groups -- 80 to 90 percent of those who have experienced interaction at significant junctures are sufficiently satisfied to consider that pattern the most desirable. The next most popular is "once or twice, but frequently with 1 or 2 members". Furthermore, most of those who have experienced the other alternatives also consider these two more desirable, in the same order. There is an interesting exception, however. Not many of the respondents have participated in the once a term or year arrangement, but most of the faculty and candidates who have, prefer it.

The cognate member of a doctoral committee plays either or both of two roles. The traditional role as an "outside" member is a device for maintaining quality control against possible parochialism of a department. The cognate member may also serve as a major guide and evaluator for a dissertation that involves his own field of specialization. These functions were not specified on the questionnaire, so that the responses to the questions about the extent of the cognate's participation represent a subjective interpretation of his function which

TABLE VI-14

Desired Interaction Pattern by Respondent's Experience

(percent preferring each kind of contact)

	Pattern of Interaction Experienced				
Faculty	Dss. completion only	Prospec. & oral only	At sig. junctures	Once or twice, freq. w/ 1 or 2	Once a term, or year
Dss. completion only	10	2	0	0	0
Prospectus & oral only	6	15	0	0	0
At sig. junctures	48	48	86	31	10
Once or twice, but freq. interact. w/ 1 or 2 mem.	26	17	6	60	0
Once a term or year	10	18	8	9	90
N.	31	66	194	316	14
Alumni					
Dss. completion	26	0	0	0	0
Prospectus & oral only	4	31	0	0	0
At sig. junctures	36	38	91	20	67
Once or twice, but freq. interact. w/ 1 or 2 mem.	22	21	2	73	33
Once a term or year	12	10	7	6	1
N.	206	290	165	542	3
Candidates					
Dss. completion	21	0	0	1	0
Prospectus & oral only	2	26	0	0	0
At sig. junctures	35	39	83	21	38
Once or twice, but freq. interact. w/ 1 or 2 mem.	21	26	7	71	31
Once a term or year	21	9	10	7	31
N.	82	137	132	343	13

might imply either position (Table VI-15). Apparently the repsonse category "major in supervision, minor in evaluation" has little relevance. Furthermore, the "other" category represents a different answer for each respondent group. Only the alumni were offered an "other" choice, as such, and few of them felt the need to use it. Of those who did, 12 reported the role as very minor or nonexistent, 7 said it was major, and 10 asked "what is a cognate member?" For the candidates

TABLE VI-15

Role of the Cognate Member, as It Is (Was) and Ought to Be*

(percent reporting each role)

	Faculty		Alumni		Candidates	
	As is	As should be	As is	As should be	As is	As should be
Minor in all respects	31	11	47	27	33	20
Major in supervision, minor in evaluation	2	3	2	4	2	5
Minor in supervision, major in evaluation	20	20	20	15	17	15
Moderate in both	27	50	18	42	16	47
Major in both	4	14	7	12	7	13
Other	17[1]	2[1]	6	0	24[2]	0

[1] Category: Generally defers to department

[2] Category: No experience yet

*Actual values differ significantly from expected values at .01 level on chi-square test.

that line on the questionnaire read "no experience yet". Thus one fourth of them were essentially excluded from judging the role of the cognate member, which distorts the proportions falling into the remaining categories. For the faculty "other" was replaced by "generally defers to department", reported by a substantial 17 percent. Given these limitations, it appears that the greatest differences of opinion occur on two of the categories. Almost half of the alumni report that the cognate member played only a minor role on the committee, while less than a third of the faculty so indicate. Significantly more of the faculty, on the other hand, judge that the cognate member plays a moderate role in both supervision and evaluation. All groups are fairly well agreed, however, that about one fifth of the cognate members play a minor role in supervision but a major one in evaluation.

When asked which role would be most beneficial to the students, half the faculty and almost half of the students answered "moderate in both supervision and evaluation". There agreement ends, however, as many more alumni and candidates prefer a minor role in all respects. In fact, that is the students' second choice, while the faculty's second choice is "minor in supervision, major in evaluation".

These faculty-student differences prevail throughout the divisions, but there are statistically significant divisional differences within the respondent groups as well (Appendix Table VI-4). The cognate member plays a minor role in all respects on significantly more committees in the physical sciences than in the other divisions. Education shows the largest proportion of cognate members who play a mixed role -- minor in supervision, but major in evaluation -- but relatively more educators would prefer a major role in both functions than is true for the other divisions. Life science also shows a higher percentage than average in this category. Education and life science differ from the rest in another interesting characteristic -- cognate members in those divisions are least likely to defer to the department.

Experience with respect to the cognate member appears to have been quite influential in choice of the most desirable role, as shown in Table VI-16. (The raw frequencies are recorded in Appendix Table VI-5). The diagonals represent people who are satisfied with the role of the cognate member as they have experienced it. The entries to the right of the diagonals represent people for whom the cognate member played a larger role than desired, and those to the left of the diagonals are the cases in which the cognate member has played a lesser role than desired.

Almost all of those for whom the cognate member has played a major role were sufficiently satisfied to prefer this relationship. And the great majority of respondents for whom the cognate member has played a moderate role in both supervision and evaluation also chose this as the most desirable. Too few respondents experienced a major role in supervision, minor in evaluation to analyze, but only half or fewer of those who have been involved with a cognate playing a minor role in supervision coupled with a major one in evaluation prefer this role. The second choice of those people was uniformly a moderate role in

TABLE VI-16

Preferred Role of Cognate Member by Role Experienced

(percent preferring each role)

	Role Actually Played				
	Minor all respects	Maj/super, min/eval	Min/super, maj/eval	Moderate in both	Major in both
Faculty					
Minor all respects	23	0	1	0	0
Maj/super, min/eval	2	55	2	2	0
Min/super, maj/eval	19	0	53	6	0
Moderate in both	48	9	30	78	12
Major in both	7	36	14	14	88
N.	196	11	126	167	25
Alumni					
Minor all respects	51	0	6	1	0
Maj/super, min/eval	3	73	2	3	0
Min/super, maj/eval	6	0	51	3	2
Moderate in both	35	23	35	87	7
Major in both	5	4	6	7	91
N.	539	22	236	210	84
Candidates					
Minor all respects	36	0	5	2	0
Maj/super, min/eval	4	69	4	2	2
Min/super, maj/eval	10	6	45	5	0
Moderate inboth	47	19	33	81	8
Major in both	3	6	13	10	91
N.	238	16	127	119	53

both functions. The degree of satisfaction with a minor role on the part of the cognate member varies greatly with respondent group. Less than one-fourth of the faculty chose this as the most desirable, almost half of them preferring instead a shift to moderate in both. Over half of the alumni who had experienced a minor role on the part of the cognate continued to prefer it, however, and a third of the candidates Moderate in both was a strong second choice of the alumni and actually the first choice of the candidates.

Ambivalence about the role of the cognate member is well illustrated by two widely disparate faculty comments. One member of the Mechanical Engineering department believes that the role of the cognate member as an external examiner should be made more important; rather than selection of a "friendly guy" from another department down the hall, he should be chosen from outside the university to maintain standards. A Psychology professor, on the other hand, states tersely that "the cognate member concept is one of the finest ideas of the 12th century."

Respondent preferences for the role of the cognate member were cross-tabulated with their choices for optimal committee size, but there does not appear to be a very informative relationship. Indeed, almost the same proportion of faculty members who opted for smaller than average three-man committees preferred a major role for the cognate as preferred a minor one. And those who preferred a committee of five did not respond in any higher proportions to a larger role for the cognate member. Similarly, alumni choosing three, four and five as optimal committee size selected a minor role for the cognate as a strong second choice in each case.

All respondent groups were asked about the frequency or severity of disagreements about the dissertation among the committee members, but the response choices differed for each group, as shown in Table VI-17, so they are not directly comparable. Apparently disagreement shows up more conspicuously among the faculty than among the other groups as only a fourth of them answered "never", while over half the alumni and 42 percent of the candidates reported at that level. Such disagreement as occurs appears to be mostly minor, however, as the largest group of faculty reports that it occurs only five percent of the time, and the student groups likewise concentrated in the infrequent or minor categories. The divisions follow this pattern for the most part.

A number of suggestions were made in the written commentary for improving the functioning of doctoral committees. A professor of Natural Resources recommends three distinctive committees: one to supervise the preparation of a student; another to administer the examination for candidacy; and a third to supervise and approve the dissertation. The student's chairman should be on all three committees. When the dissertation is accepted by him it should be reviewed by every member before

TABLE VI-17

Frequency of Committee Disagreements about Dissertations

(percent at each level)

		Division				
Faculty	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Never	23	24	24	20	25	15
Less than 5%	45	41	42	41	54	61
5 - 10%	21	22	21	26	15	17
15% or more	11	13	13	13	6	6
Alumni						
No disagreement	53	49	56	54	49	54
Minor	23	25	19	26	21	28
Some significant	5	6	3	5	10	4
Serious	4	4	3	3	4	6
Don't know	15	16	20	11	16	7
Candidates						
Never	42	42	54	35	42	44
Once in a while	18	17	13	22	16	21
Often	4	5	3	4	2	6
Too early to tell	36	36	30	39	40	30

the final examination, which should not be an oral "defense", but a final reading for adherance to suggestions, creativity and so on. A colleague in Psychology concurs to the extent that he believes the advisor should not be the evaluator, that if the two functions are separate the product will improve. A professor of Electrical Engineering suggests a set of guidelines be articulated for committee members, which define the criteria for evaluation of dissertations, perhaps spelling out goals for students and faculty, so that all members operate on the same ground rules, especially in interdisciplinary committees.

An alumnus in Engineering proposes that formal committee meetings be scheduled every six months so that students get sufficient feedback. He goes on to recommend student evaluation of the committee's performance at the end of the process. A candidate in Urban and Regional Planning also advocates student evaluation of the committee members, for the reference of future students. A History candidate is concerned about feedback on his performance, which he finds the most difficult aspect of his training. He suggests that access to student files and anonymous evaluation of his work by the faculty might help to overcome the delicacies of the face-to-face faculty-student conference.

A number of candidates are highly critical of their committees. Two Psychology students report that the committee is not useful, only the chairman. An Anthropology candidate finds that a major problem is the "disappearance of committee members", on leave or by termination. Another student in the same field complains that he "Felt at all times that my presence in prof's lives was an imposition ... They may be great scholars, but as teachers they're mostly failures." Despite disappointments, however, students do think the committee members important. This view is experssed by the candidate in Industrial Toxicology who believes that the committee's responsibility goes beyond research guidance and review of the thesis; its members should, (but usually don't) "impart wisdom they have achieved during their careers."

Importance of Formal and Informal Student-Faculty Interactions

Faculty are much more satisfied than their students and former students with both the formal and informal relations currently prevailing between them (Table VI-18). Almost two thirds of them rate these adequate to good.

TABLE VI-18

Evaluation of Student-Faculty Interactions*

(percent with each opinion)

	Evaluation				
Formal arrangements	Good	Adequate	Could be improved	Needs revision	No opinion
Faculty	17	44	28	7	3
Alumni	14	32	36	10	8
Candidates	9	29	35	14	12
Informal arrangements					
Faculty	24	40	24	8	3
Alumni	20	31	30	10	9
Candidates	15	30	31	12	12

*Actual values differ significantly from expected values at .01 level on chi-square test.

On the question of formal arrangements alumni are evenly divided between those who approve and those who think revision or improvement is needed, while candidates are somewhat more dissatisfied than satisfied. Informal arrangements meet with greater satisfaction among students than the formal arrangements do, in that candidates divide evenly and half of the alumni approve. The divisions display a pattern similar to the total group.

The two student groups were asked on a different question to report their opinions about these interactions in greater detail. Five kinds of interactive situations, formal and informal, were presented and the respondents were asked to rate their value on a scale of one to four as well as the frequency of their occurance on a four-point scale.

The alumni response is shown in Table VI-19. Casual conversation with faculty was clearly the most valuable experience for them, with 83 percent reporting this of significant or great value. Regular seminars follow in second place, with over two thirds reporting those kinds of interaction valuable. Although research team or group meetings are reported of no value by a high one fifth of the alumni, over half the group found these significantly or greatly valuable. Colloquia with student papers were the least popular form of interaction. Looking at the lower half of the table it is immediately evident that the most frequently

TABLE VI-19

Alumni Evaluation of Faculty-Student Interactive Situations*

(percent with each rating)

	Interactive Situation				
Value	Colloq.w/ invtd.spkrs.	Regular seminars	Res.tm./ gp.mtgs.	Colloq/ stud. papers	Casual convers.
No value	11	6	21	16	2
Some value	39	25	25	39	15
Significant value	29	39	33	30	32
Great value	21	30	21	15	51
Frequency					
Never	13	13	48	32	2
Occasionally	53	37	34	47	34
Often	23	31	12	16	34
Very often	11	18	6	5	30

*Actual values differ significantly from expected values at .01 level on chi-square test.

occurring interactions are also the most favored -- casual conversations and regular seminars. Over three quarters of the alumni report that research team or group meetings and colloquia with student papers never or only occasionally occured. Table VI-20 further supports the conclusion that the more frequently any form of interaction occurs the more highly it is valued. For example, even though colloquia with student papers are the least favored, those who experienced them most often are most inclined to approve.

TABLE VI-20

Value to Alumni of Faculty-Student Interactions by Frequency of Occurance

(percent with each rating)

	Frequency			
	Never	Occasionally	Often	Very Often
Colloquia, Invited Speakers				
No value	40	7	5	6
Some value	30	49	28	23
Significant value	20	28	40	23
Great value	11	16	27	48
Regular Seminars				
No value	31	5	1	1
Some value	20	36	20	15
Significant value	30	38	52	24
Great value	20	21	27	60
Research Team or Group Mtgs.				
No value	41	5	1	1
Some value	25	34	10	5
Significant value	23	39	54	28
Great value	11	22	35	65
Colloquia with Student Papers				
No value	35	9	5	11
Some value	31	49	29	17
Significant value	22	30	43	32
Great value	12	12	23	41
Casual Conversation				
No value	31	4	1	-
Some value	15	30	8	4
Significant value	8	35	47	13
Great value	46	31	44	82

Although the differences among divisions in value and frequency of any one form of interaction are statistically significant, they are fairly small in magnitude and no clear pattern of difference emerges (Appendix Tables VI-6 and VI-7). The major exceptions occur among the large majority of life scientists and educators who found research team or group meetings of significant or great value even though they did not occur with much greater frequency in those divisions than in the others. In humanities, this kind of interaction was found to be significantly or greatly valuable by almost a third of the alumni, despite the fact that 72 percent reported that it never occurred.

The candidate response to these questions is quite similar to that of the alumni (Tables VI-21 and VI-22), except that for candidates regular seminars and research team group meetings are about equally popular with over half the group. The frequency with which these interactions occur is also about the same for candidates as for alumni, except that only 21 percent of candidates report casual conversation with faculty very often, contrasted to 30 percent of alumni who so reported. There is less divisional variation for the candidates than for the alumni (Appendix Tables VI-8 and VI-9). Life scientists find research team or group meetings more valuable than the others, but they also report

TABLE VI-21

Candidates' Evaluation of Faculty-Student Interactive Situations*

(percent with each rating)

	Interactive Situation				
Value	Colloq.w/ invtd.spkrs.	Regular seminars	Res. tm./ gp.mtgs.	Colloq./ stud.pprs.	Casual convers.
No value	11	9	19	14	3
Some value	49	33	25	44	15
Significant value	28	37	31	31	37
Great value	13	22	24	11	45
Frequency					
Never	15	20	51	36	5
Occasionally	60	29	30	45	38
Often	20	40	13	15	36
Very often	5	11	6	4	21

*Actual values differ significantly from expected values at .01 level on chi-square test.

TABLE VI-22

Value to Candidates of Faculty-Student Interactions by Frequency of Occurance

(percent with each rating)

	Frequency			
	Never	Occasionally	Often	Very Often
Colloquia with Invited Speakers				
No value	34	7	6	8
Some value	38	53	44	49
Significant value	18	29	32	26
Great value	10	11	18	18
Regular Seminar				
No value	31	4	2	2
Some value	24	40	31	24
Significant value	25	37	46	37
Great value	20	19	21	37
Research Team or Group Mtgs.				
No value	34	6	4	0
Some value	25	34	16	6
Significant value	23	40	47	20
Great value	18	20	33	74
Colloquia with Student Papers				
No value	26	8	6	7
Some value	41	52	30	26
Significant value	23	30	50	30
Great value	10	9	14	37
Casual Conversation				
No value	29	1	1	1
Some value	9	27	10	5
Significant value	24	39	46	22
Great value	38	33	43	72

a greater frequency for this type of interaction. Social science, humanities and education candidates find greater value in regular seminars than the other divisions, despite the fact that they report somewhat less frequency.

The desirability of extensive faculty-student interaction was singled out for comment in several cases. A faculty member in Social Work feels that more structured faculty-student interaction is needed, while a colleague in Geology would like to see more informal as well as formal faculty and peer evaluation of research in progress through presentation in discussion groups. An alumnus in Chemistry observes that faculty-student relations are too formal. Candidates simply want more -- more seminars and social contact between students and faculty, requested by a Physics student, and more interaction generally, desired by a candidate in Computer Science, who says his department tends to "benign neglect".

Summary

Both the chairman and the doctoral committee are usually selected by joint decision between student and faculty. About one sixth of the students believe they have received less supervision from their chairman than the chairmen report providing, and significantly more chairmen than students believe they provide moderately heavy supervision. But all agree that 60 percent of chairmen provide moderate supervision evenly throughout or with emphasis at initial and final stages of the dissertation. These are the most popular kinds of relationship, although generally students prefer more supervision rather than less. Alumni and candidates both report a generally harmonious relationship with their chairmen. Those students who are dissatisfied identify the major problems as insufficient time given them by the chairman, ambiguity of his expectations, an unhelpful attitude or lack of stimulation.

Faculty, except in social sciences and humanities, tend to prefer larger doctoral committees, while students would prefer smaller ones. Students, especially in humanities, do not appear very anxious for a non-university professional on the doctoral committte, although physical scientists are most interested. Many more alumni and candidates, relatively, report interaction with their committees at initial and/or final stages than faculty do, while more faculty report interaction at significant junctures. But all three groups agree that half the students interact with the committee "once or twice but frequently with one or two members". That is a first preference for students and a fairly close second choice, after significant junctures, for faculty. Those who have experienced these two types of interaction also chose them as the most desirable, as did most of the others who experienced a different relationship.

The function of the cognate member is ambiguous, and more often than not he plays a minor role, with a minor role in supervision, major in evaluation the second most frequent. A moderate role in both is the first choice of all respondent groups, however.

Alumni and candidates agree that the most valuable form of faculty-student interaction, as well as the most frequent, is casual conversation, with regular seminars following second on both counts.

VII

HOW LONG DOES IT TAKE TO ATTAIN A PH.D. DEGREE?

One of the most important issues addressed by the dissertation review concerns the amount of time a doctoral candidate spends in the program as a whole and on the dissertation phase itself. About a dozen questions were asked on the survey with respect to various aspects of the time dimension, most of them directed to candidates and alumni. They dealt not only with the number of years students used, but the stage at which dissertation research is begun, anxiety about delays in its completion, reasons for delay, and the desirability of shortening the dissertation phase.

Time in Degree Program

Alumni

The number of years alumni spent in obtaining the doctoral degree is shown in Table VII-1, measured in both elapsed time and full time equivalency. A definition of "full time equivalent" was not provided on the questionnaire, however, so that the subjective interpretation of this measurement by each respondent resulted in some inconsistencies, which render that concept less useful than it might have been.

Almost two thirds of all alumni spent five years or less altogether in obtaining the Ph.D. Degree. For three quarters of them this represented four full time equivalent years. A cross tabulation of these two measurements yields the proportion of students who worked full time on their degrees, defined by the diagonals in Table VII-2. Those responses lying above the diagonals probably represent misinterpretations of the question, as, by definition, the number of full time equivalent years cannot exceed the number of elapsed years. The percentages below the diagonals represent alumni who worked on theirdegrees less than full time.

Approximately half of the alumni appear as full-time students. This derivative may be an overstatement because 86 percent of them reported

TABLE VII-1

Alumni Time Spent in Ph.D. Program
(percent at each time level)

		Division*				
Elapsed Years	Total	Life Sci	Phys. Sci	Soc. Sci	Human.	Educ.
1-3	20	19	21	10	18	34
4	22	37	31	21	19	14
5	21	21	20	29	16	14
6	14	11	14	17	14	10
7	9	6	7	12	10	9
8	5	4	3	5	8	3
9 or More	9	1	3	7	15	15
Full Time Equiv. Years						
1-3	40	34	36	29	38	69
4	35	43	36	36	35	22
5	14	14	16	23	12	4
6	7	8	7	8	9	3
7	2	1	2	3	2	1
8 or More	1	0	1	1	4	0

*Actual values differ significantly from expected values at .01 level on chi-square test.

TABLE VII-2

Time Status of Alumni While in Doctoral Program

(percent at each elapsed time level)

	Number of Full Time Equivalent Years in Program						
No. of Elapsed Yrs.	1-3	4	5	6	7	8	9
1 - 3	49	1	1	0	0	0	0
4	22	43	3	2	0	9	33
5	14	21	52	1	0	0	0
6	6	16	18	45	4	9	0
7	4	8	10	18	50	9	0
8	1	4	7	15	14	27	0
9 or More	3	7	9	18	32	46	67
N.	190	426	176	87	28	11	3

elsewhere on the questionnaire that they worked full time or part time while writing the dissertation (Chapter III, Tables III-10 and III-12). Apparently, many alumni considered themselves full time students even though they may have worked at least part time at a job. But 43 percent of those who worked held jobs directly supportive of the dissertation research. Consequently, Table VII-2 is not as inconsistent with other data as it may at first appear.

The year in which a graduate received his or her degree is of little consequence, but there are significant differences among the divisions in the longevity of their doctoral students (Table VII-1). The life and physical science alumni clearly completed the process considerably faster than those in social sciences and humanities, with over half of the former group finishing in four elapsed years or less, contrasted to about one third of the latter. Furthermore, another quarter to a third of social science and humanities students took 7 years or more to finish, while only 11 and 13 percent of the life and physical scientists took that long. The education Ph.D.s display a unique pattern. A third of them finished in one to three years, the largest group in this category. On the other hand, more than a quarter of the alumni in this division took seven years or longer. Thus the education group seems to combine both the short and long-term characteristics of all the other divisions. In full time equivalency education students are again the fastest, while social scientists are slowest.

One important explanation for these divisional differences is the divergence in the proportions of students who studied full time. The divisional employment data in Chapter III, Table III-10, are supported by the self-reporting which shows up in the diagonals in Appendix Table VII-1. That is, life science alumni were the least employed while writing the dissertation and physical scientists displayed the lowest rate of full time employment. And the members of these two divisions reported themselves full time students to a much greater degree than those in the other divisions. But it is interesting to note the largest proportion of self-defined full time students is not found in the one to three year completion category. Apparently for students in life and physical science, and social science as well, speed of completion is not heavily dependent upon full time commitment. In humanities and education, on the other hand, the highest full time proportions are found among the alumni completing the degree in one to three years. It seems clear that the part-time nature of doctoral study in humanities provides some explanation for the significantly higher proportions in that division who take an exceptionally long time to complete the degree. It is not so apparant why a significantly higher proportion of education alumni completed the degree in only one to three years, despite the fact that they are the most heavily employed students at full time and their self-defined full time proportions were as low as those in humanities.

Although alumni were asked only "to what extent were you employed while writing the dissertation?" and were not queried about their employment during the entire Ph.D. program, Table VII-3 confirms that their level of employment made a difference in the number of elapsed years in the program. Level of employment was not significantly related to full time equivalent years, however, either in the program or in the dissertation phase. Over 61 percent of those who worked one quarter time, completed the whole program in four calendar years or less. Students working half or three quarter time took somewhat longer on the average. And of the alumni who worked full time while writing the dissertation almost a fourth took eight years or more to obtain the degree, while the rest are quite evenly distributed over the elapsed time periods.

TABLE VII-3

Alumni Time Spent in Ph.D. Program by Amount of Time Spent in Employment While Writing Dissertation*

(percent at each time level)

	Time Spent in Employment			
Elapsed Years	Quarter Time	Half Time	Three-Quar. Time	Full Time
1 - 3	28	19	14	15
4	33	28	21	15
5	19	22	29	18
6	11	14	16	15
7	3	8	13	12
8 or More	6	9	7	24
N.	311	255	76	424

*Actual values differ significantly from expected values at .01 level on chi-square test.

There are significant differences by division in the effect of various levels of employment on time spent in the program (Appendix Table VII-2). Full time employment exerted the most delay on social science and humanities students, who were also among those most likely to be employed full time. One third and half of them, respectively, took seven years or more to finish, although almost half of the fully employed social scientists did manage to complete their doctorates in five or six elapsed years. And among education alumni employed full time, the largest such group, almost a fourth finished in one to three years. Life and physical scientists, fewer of whom worked full time, were not likely to be slowed as much when they did; half finished in four years or less anyhow, although almost a fourth took seven years or more.

Among alumni who worked part time, most life science, physical science and education students working quarter time finished faster than those working half to three quarters time. But among social scientists and humanists the speed of completion was not appreciably faster for those working fewer hours.

There are no significant differences between men and women in the duration of their doctoral programs, but age is a significant variable. Table VII-4 shows that the proportion of long term doctoral students rises with age at which the degree was completed. Most of the youngest students, under age 28, finished within five elapsed years, as chronological restraints would lead one to expect. The 28-35 years olds are distributed quite similarly over the time periods of elapsed years, about two-thirds finishing within five years. But a very substantial one third of those 36 years of age or older when they obtained the degree took eight years or more to do so.

The hypothesis that the older students were more likely to be working, and working longer hours, while they pursued the degree is supported by the findings in the lower part of the table. There is very little difference over the range of the four age groups above 28 in the number of full time equivalent years spent in the doctoral program.

TABLE VII-4

Alumni Time Spent in Ph.D. Program by Age When Completed Degree*

(percent of age group at each time level)

	Age Group					
Elapsed Years	25 or Under	26-27	28-30	31-32	33-35	36 and Older
1 - 3	40	20	22	18	18	16
4	47	39	22	25	18	13
5	9	32	20	20	23	13
6	3	7	19	15	17	12
7	0	1	11	10	9	14
8 or More	0	0	6	12	15	33
N.	64	232	327	166	146	295
Full time equivalent yrs.						
1 - 3	56	32	37	40	43	47
4	38	42	34	32	35	29
5	6	21	16	15	10	11
6	0	4	8	11	9	7
7 or More	0	0	5	2	3	6
N.	64	235	328	168	145	293

*Actual values differ significantly from expected values at .01 level on chi-square test.

Age is associated with the extent to which alumni were employed while they were writing their dissertations (Table VII-5). Most of the younger students who worked were employed half time or less, while 60 percent of those 36 or over when they received the degree were employed full time, as were 55 percent of those between 33 and 35. The ratio ranged among the divisions (Appendix Table VII-3) from 47 percent of the physical scientists (the youngest division overall) age 36 and over who worked full time to 68 percent of the educators (the oldest division) aged 33 and over who worked full time. Among social scientists age did not seem to be as important a factor in the amount of working time.

The tendency for older students to more intensive employment while writing the dissertation explains the longer period of elapsed time they spend in the program compared with younger people. But it does not explain why, in terms of full time equivalent years (Table VII-4),

TABLE VII-5

Amount of Working Time by Age Group of Alumni*

(percent at each working level)

Amount of Work Time	Age group 25 and under	26-27	28-30	31-32	33-35	36 and over
Quarter time	50	42	32	32	15	17
Half to 3/4 time	32	35	37	30	29	23
Full time	18	22	31	37	55	60
N.	50	202	279	140	130	275

*Actual values differ significantly from expected values at .01 level on chi-square test.

they finish their doctoral work as fast or faster. The proportion of alumni who completed the degree in three full time equivalent years or less actually rises with age group above 25. The proportions of students finishing in four and five full time equivalent years decline with age, but at six full time years or more age makes virtually no difference at all.

Despite the importance of age and amount of employment in contributing to variance in elapsed time spent in the Ph.D. program, marital status made no significant difference. Possession of the Master's Degree was statistically significant, however, for both elapsed time and full time equivalent inthe program, as was the stage at which dissertation research was begun.

Table VII-6 shows that 75 percent of all alumni had attained the Master's Degree when they entered the doctoral program. This proportion varied among divisions from a low of 58 percent in the life and social sciences to 90 percent in the humanities and 94 percent in education. Possession of the M.A. made a considerable difference among students completing the Ph.D. in a relatively short period of time. A quarter of those with an M.A. finished in one to three years, contrasted to only 8 percent of those without. But by the time five years in the Ph.D. program had elapsed, the same proportion of students without the Master's Degree as those with it had completed the doctorate. Furthermore, 10 percent of those with the M.A. took nine years or more to complete the Ph.D., contrasted to only 3 percent of those without the intermediate degree.

TABLE VII-6

Elapsed Time Spent in Ph.D. Program for Alumni With and Without M.A.*

(percent at each time level)

		Elapsed Years						
	Total	1-3	4	5	6	7	8	9 or More
All Alumni								
With M.A.	75	24	23	17	12	9	4	10
Without	25	8	28	30	17	9	5	3
Life Sciences								
With M.A.	58	29	35	13	9	8	1	4
Without	42	6	39	32	14	3	7	0
Physical Sciences								
With M.A.	76	25	32	18	13	6	3	4
Without	23	10	29	25	17	11	5	4
Social Sciences**								
With M.A.	58	13	18	26	15	15	5	8
Without	42	6	25	33	30	8	4	4
Humanities**								
With M.A.	90	20	20	14	13	9	8	16
Without	10	8	8	29	21	21	8	4
Education**								
With M.A.	94	35	14	12	10	9	3	16
Without	6	15	15	39	15	8	0	8

*Actual values differ significantly from expected values at .05 level on chi-square test.

**Not significant.

Most of the differential in elapsed time between students with Master's Degrees and those without is accounted for by the life sciences and physical sciences. In humanities and education so few of the alumni did not have the M.A. when they began their doctoral work as to render contrasts meaningless. In social science the proportions with and without M.A.s was the same as for life science, but in the former group there is no difference at all in elapsed time by the fourth year, whereas among life scientists the contrast is substantial.

Over half of the alumni began their dissertation research at the later stages of their course work or after the course work was completed (Table VII-7). The remainder of them were quite evenly distributed over the other categories. When they started, however, made a difference in how many years they spent in the program, in both elapsed and full time equivalent years. As expected, those who began their research earlier

TABLE VII-7

Alumni Elapsed Time in Ph.D. Program by Starting Time for Dissertation Research*

(percent at each time level)

Elapsed years	Early course	Middle course	Later course	After course	After candidacy
1 - 3	29	25	20	16	14
4	34	30	25	21	16
5	17	23	17	25	21
6	9	10	16	14	14
7	4	5	10	11	10
8	4	4	4	6	6
9 or more	3	2	8	8	19
N.	12	16	31	24	16

*Actual values differ significantly from expected values at .01 level on chi-square test.

tended to finish the program earlier. These differences are accounted for almost entirely by differences among the divisions in their characteristic starting times for dissertation research. Life and physical scientists generally start earlier than the other three divisions, and their students also tend to finish sooner, except for education. Consequently elapsed time is not significantly associated with starting time for research within the divisions (Appendix Table VII-4), and life and physical science alumni tended to complete the program in five years or less even when they started late. Education students, too, finished in four years or less almost no matter when they started their research. Social science and humanities alumni, who were more likely than the others to start the dissertation research at later stages, took longer to complete the program even when they started at an early stage.

It is clear that five variables made a significant difference in how long alumni took to attain the doctoral degree: division, age, possession of the Master's Degree, when the dissertation research was begun and the extent to which the student was employed while writing the dissertation. The question remains as to how much influence each of these explanatory variables exerted, especially in light of the inter-correlation of several of them with division. Multiple regression analysis offers a way of pulling together in succinct form the various influences on time spent in the Ph.D. program, and identifying the importance of each. For this analysis an additional independent, or predictor, variable is introduced: number of full time equivalent years spent on the dissertation itself (Table VII-8).

The analysis yields a multiple correlation coefficient squared of .39, indicating that these six predictor variables explain about 39 percent of the variation in the number of years alumni spent in the doctoral program. The contribution made by each predictor variable is shown in the following estimating equation, which can be used directly to estimate the number of years a student with any given set of characteristics will use to complete the doctoral program. For example, a student in humanities, aged 33-35, who has an M.A., begins dissertation research after candidacy, works full time while writing the thesis, and takes three full time equivalent years to do so, may be expected to spend seven years in the program. If the same student took only one full time equivalent year to write the dissertation he would be expected to spend only six years in the program.

When the regression analysis is performed separately for each division the predictability of the equation rises for life science and humanities, to explain 46 percent and 54 percent of the variation in elapsed time, respectively. For the other three divisions R^2 remains essentially the same. The estimating equation for each division is shown in Appendix Table VII-5. These equations reveal that not all of the predictor variables make a significant contribution in each division. Age is the only one that is significant at the .01 level for all of them. In education there are only two significant predictors of elapsed time -- age and the stage at which dissertation research is begun. These two

TABLE VII-8

Regression Equation for Number of Elapsed Years in Ph.D. Program

Elapsed Time in Program = 3.41 (5+ years)

- .33	years	Life Science	Division
- .05	"	Physical	
+ .23	"	Social Science	
+ .39	"	Humanities	
- .24	"	Education	
- .51	"	Early Course	Stage at which Begin
- .45	"	Mid Course	
+ .17	"	Late Course	
+ .17	"	After Course	
+ .62	"	After Candidacy	
- .39	"	Have M.A.	
+ .39	"	No M.A.	
-1.05	"	Under 25	Age
- .73	"	26-27	
- .19	"	28-30	
+ .06	"	31-32	
+ .46	"	33-35	
+1.45	"	36 and over	
- .42	"	Quarter Time	Amount of Employment
- .09	"	Half Time	
+ .11	"	3/4 Time	
+ .40	"	Full Time	
- .61	"	.5	FTE Years on Dissertation
- .89	"	1.0	
- .64	"	1.5	
- .06	"	2.0	
+ .12	"	2.5	
+ .36	"	3.0	
+1.72	"	3.5 or more	

$R = .63$ $R^2 = .39$ S.E. = 1.63

factors alone explain 40 percent of the variation among education alumni. In humanities, on the other hand, all of the predictors are significant (possession of the M.A. at the .05 level) and together explain a substantial 54 percent of the variance. In the physical sciences all the predictors are signficant, except amount of employment, but this division shows the lowest R^2 at 38 percent. Life science and social science are similar in that the stage at which students begin the dissertation is not signficant in either, possession of the Master's Degree is significant at the .05 level, and in life science the amount of employment is also significant at 5 percent. Nevertheless, a substantially larger proportion of the variance is explained for life scientists, 46 percent, than for social scientists at 40 percent. The greater accuracy of the estimating equations separated for each division is illustrated by the example used earlier of the aging humanities student. Using the humanities equation that student would be predicted to spend well over eight years in the program if he used 3 full time years to write the dissertation and almost seven if he used only one.

Candidates

The distribution of candidates according to number of elapsed years in the Ph.D. program is remarkably similar to that of the alumni, even though the sample of candidates includes some who have barely begun their dissertation work. As Table VII-9 shows, a fifth of the candidates have been in the program one to three years, another fourth have spent four years, and the remainder distribute in gradually declining proportions. Almost a third of these people are all but finished with their dissertations and,therefore,are about ready to receive the degree (Table VII-10), another third have almost completed the dissertation, and a third are half finished or less, with only eight percent just beginning the dissertation. It therefore looks as though two thirds of the current crop of candidates, like the alumni, will finish in five years or less. But the number of elapsed years a candidate will ultimately spend in the program does not appear to be significantly related to how nearly finished he or she is with the dissertation. Table VII-11 shows that about half the candidates who are just beginning or are only half finished have been in the program four years or less, but so have half of those who have finished completely, and the "nearly dones" are not far behind. At the other extreme a remarkably similar proportion of candidates at each level of completion have been in the program seven or eight years.

TABLE VII-9

Candidate Time Spent in Ph.D. Program
(percent at each time level)

Elapsed Years	Total	Division * Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
1-3	20	26	25	8	20	33
4	26	42	30	26	17	21
5	16	15	15	20	14	9
6	14	6	16	15	17	13
7	12	4	9	18	13	8
8	5	3	3	6	9	7
9 or more	7	4	2	7	9	7
Full time equiv. years						
1-3	38	40	42	25	34	73
4	33	46	31	36	28	15
5	19	10	15	25	25	7
6	6	3	10	8	6	2
7	3	1	1	5	3	1
8	1	0	0	1	3	1

*Actual values differ significantly from expected values at .01 level on chi-square test.

TABLE VII-10

Fraction of Dissertation Work Completed by Candidates
(percent at each level of completion)

Level of Completion	Total	Life Sci.	Phys Sci.	Division Soc. Sci.	Human.	Educ.
Beginning	8	5	7	9	8	12
One-quarter	13	13	6	14	17	14
Half	13	12	6	18	17	9
Three-quarters	16	12	19	16	13	17
Near done	18	20	23	16	15	14
Final review	6	9	4	6	5	6
Finished	23	23	30	18	21	26
Can't say	4	5	5	3	4	2

TABLE VII-11

Candidates' Elapsed Time in Ph.D. Program by Fraction of Dissertation Work Completed

(percent at each time level)

Elapsed Years	Fraction of Dissertation Work Completed							
	Beg.	One Quarter	Half	Three Quar.	Near Done	Final Rev.	Finished Completely	Can't Say
1-3	29	28	19	23	12	7	19	20
4	22	30	30	21	24	32	29	27
5	14	14	18	14	20	7	17	17
6	14	10	15	19	14	15	11	13
7	12	12	11	12	14	12	11	7
8	5	2	4	5	5	17	7	3
9 or More	3	4	2	6	11	10	7	13

Inferences drawn about how long those candidates who are less than half way through their dissertations will ultimately take to achieve the degree are likely to be unreliable, but the elapsed time already used by those who range from "nearly done" to "finished completely" indicates that the differences among divisions hold for candidates in the same way they did for alumni (Appendix Table VII-6). About two thirds of the life science and physical science candidates who fall into those categories have been in the program four years or less, while a third or more in social science and humanities have already used seven years or more.

The same discrepencies as with alumni arise between candidates who, in effect, judge themselves full time students as shown in a cross-tabulation of elapsed years by full time equivalent years (Table VII-12) and the 82 percent who report themselves employed while writing the dissertation. The diagonals in the table indicate that a third to half of the candidates consider themselves full-time students. (Entries above the diagonal again represent a misunderstanding of the question.) Relatively fewer long-term candidates report that they are full time students than did the long-term alumni, but the divisional pattern is also about the same as for the alumni in that many more life and physical science students identify as full-time than do the others.

TABLE VII-12

Time Status of Candidates
(percent at each elapsed time level)

No. Elapsed Years	Number of Full Time Equivalent Years in Program: 1-3	4	5	6	7	8	9 or More
1-3	48	2	2	0	9	25	0
4	24	50	3	2	0	0	0
5	10	18	34	2	0	0	0
6	8	14	19	35	0	0	0
7	6	11	19	25	46	0	0
8	3	3	10	14	14	25	100
9 or More	2	2	12	21	32	50	0
N.	282	241	139	48	22	4	4

Candidates are employed while working on the dissertation to about the same extent as alumni, but the number of hours spent on the job is higher. Almost half the candidates are employed full time, contrasted to 40 percent of alumni, and this differential prevails in every division, ranging from 5 percentage points among physical scientists to 13 points among educators. As one would expect, candidates working full time, like the alumni, tend to be longer in the program than those working only part time, but the relationship does not seem as strong for the current students (Table VII-13). Most of these differences are accounted for

TABLE VII-13

Candidate Time in Ph.D. Program by Amount of Employment While Writing Dissertation*
(percent at each time level)

Elapsed years	Quarter time	Half time	Three quarters	Full time
1-3	24	19	24	15
4	32	28	24	18
5	17	20	9	15
6	11	16	14	15
7	9	9	17	18
8	5	5	7	8
9 or more	2	3	5	11
N.	149	131	42	301

*Actual values differ significantly from expected values at .01 level on chi-square test.

by the differences among divisions in both the average longevity of their students and the age-employment pattern. Indeed, within four of the divisions there is no significant difference in elapsed years among students working part time and those working full time. Only in humanitiies are the full working time students significantly longer in the program than those working part time.

Age appears to make a difference in how long candidates take to complete the program, measured in both elapsed years and full time equivalent, just as it did for alumni. (By the same token, sex and marital status are not significant.) Almost half of the candidates are between 26 and 30 years old. Virtually all of those under 28 have been in the program five years or less (Table VII-14), while the remaining age groups tend to be more evenly distributed over the levels of elapsed years. A substantial 19 percent of those 36 years old

TABLE VII-14

Candidates' Time in Ph.D. Program by Age Group*

(percent at each time level)

				Age Group		
Elapsed Yrs	25 and Under	26-27	28-30	31-32	33-35	36 and Over
1-3	42	26	16	18	16	16
4	49	37	30	19	16	17
5	7	25	17	16	13	11
6	2	10	16	11	18	16
7	0	2	16	19	15	14
8	0	0	4	12	10	8
9 or more	0	0	1	5	12	19
N.	45	133	216	110	87	145
Full Time Equiv. Yrs.						
1-3	56	36	35	31	38	45
4	32	42	35	30	28	26
5	12	17	19	31	15	14
6	0	4	8	4	12	7
7 or more	0	1	3	4	7	8

*Actual value differ significantly from expected values at .01 level of significance on chi-square test.

or older, however, have already spent nine years or more pursuing the doctorate. The pattern by division is very similar to that for the total group, with the major exception that in education even the oldest students tend to complete their doctoral work in four years or less.

In terms of full time equivalent years the age transition along the scale of study years is not so smooth. In fact, whereas roughly one third of the candidates between 26 and 35 have spent one to three full time equivalent years in the program, 45 percent of the oldest students fall into that category as well, illustrating perhaps that the older students are longer in the program because they devote a considerably smaller portion of their time to their studies. For candidates, as for alumni, student employment is an important factor.

Table VII-15 shows how the extent to which candidates work is significantly related to their age. Three quarters of the candidates under age 28 who work, work half time or less, contrasted with 71 percent of those 36 and over and 55-60 percent of those between 31 and 35 who work full time. There are some important contrasts here with alumni (compare Table VII-5). The patterns are quite similar under age 28, although a third more candidates than alumni age 25 or less work full time. The most marked differences are in the 28-32 year old groups, where substantially more candidates than alumni work full time, and among those 36 and older where 71 percent of the candidates work full time contrasted to 60 percent of the alumni.

TABLE VII-15

Amount of Working Time by Age group of Candidates*

(percent at each working level)

	Age Group					
	25 and under	26-27	28-30	31-32	33-35	36 and over
Quarter time	56	38	24	21	19	15
Half time	20	34	25	15	20	8
Three-quarter time	0	9	9	3	7	6
Full time	24	19	42	61	55	71
N.	25	106	180	97	75	137

*Actual values differ significantly from expected values at .01 level on chi-square test.

Two thirds of the candidates had a Master's Degree when they entered the doctoral program and they are likely to complete their doctoral work sooner than those who do not. This contrasts sharply with the 75 percent of alumni who had that degree, accounted for mostly by a drop in humanities M.A.s from 90 percent to 78 percent and physical science from 76 percent to 69 percent. As Table VII-16shows, about half of the candidates with Master's Degree have been in the program four years or less, compared with slightly over a third of those without that degree. Nor do the candidates without the M.A. catch up until after five years

TABLE VII-16

Elapsed Time in Ph.D. Program for Candidates with and without M.A.*

(percent at each time level)

		Elapsed years						
Total	All	1-3	4	5	6	7	8	9 or more
Have M.A.	67	25	26	14	13	9	6	7
Have not	33	8	27	21	16	18	4	5
Life science								
Have M.A.	56	29	38	15	5	3	5	4
Have not	44	23	46	15	8	6	0	2
Physical science								
Have M.A.	69	33	24	15	14	8	2	3
Have not	31	7	40	14	21	12	5	2
Social science								
Have M.A.	53	11	30	16	16	13	6	7
Have not	47	4	22	24	14	24	6	7
Humanities								
Have M.A.	78	25	20	10	14	9	11	10
Have not	22	3	6	26	26	27	3	9
Education**								
Have M.A.	98	32	22	10	12	8	7	8
Have not	2	50	0	0	50	0	0	0

*Actual values differ significantly from expected values at .05 level on chi-square test.

**Not significant.

have elapsed. Beyond seven years in the program it appears to make little difference whether a candidate has the M.A. or not.

Most of these differences are accounted for by candidates in the humanities, where possession of the M.A. appears to be critical. Over three quarters of the humanities candidates do have the degree when they enter, and almost half of them have been in the program four years or less, contrasted to only 9 percent of those without the Master's. The bulk of the non-Master's students have been in the program five to seven years.

The number of elapsed years a candidate spends in the doctoral program varies significantly with the time at which he or she begins research on the dissertation, but these differences, too, are accounted for largely by the differential pattern among the divisions, as shown in Table VII-17 and Appendix Table VII-8. Almost two thirds of the candidates who begin the dissertation research in the early or middle stages of course work (mainly life and physical scientists) have spent four years or less in the program. This proportion declines with post-

TABLE VII-17

Candidate Elapsed Time in Ph.D. Program

by Starting Time for Dissertation Research*

(percent at each time level)

	Starting Time				
Elapsed Years	Early Course	Middle Course	Later Course	After Course	After Candidacy
1-3	33	27	19	13	16
4	31	38	29	19	21
5	11	17	17	16	17
6	14	9	14	17	14
7	7	4	10	18	16
8	1	3	4	6	11
9 or more	3	2	6	10	6
Percent at each starting time	10	15	30	28	17

*Actual values differ signficantly from expected values at .01 level on chi-square test.

ponement of dissertation research to about one third of those who begin after course work or candidacy. Conversely the proportion of candidates who have been seven years or more in the program rises from roughly ten percent of those who began in the early and middle stages to one third of those who begin after course work or candidacy.

Time Devoted to the Dissertation

Candidates

Because the proportion of a student's total graduate study period spent in writing the dissertation varies with the individual and the department, respondents were asked about the number of years spent on this phase only in terms of full time equivalency. But the question is meaningful for candidates only if they are close to completion and, therefore, can make a fairly accurate estimate of how long the process has taken.

Approximately half of the candidates who responded to the questionnaire were nearly finished with their dissertations, at the final review stage or were completely finished. In these three categories over half the respondents had used 1.5 to 2.5 full time years in the dissertation phase (Table VII-18). But there is a striking difference among

TABLE VII-18

Time Spent on Dissertation by Nearly Finished Candidates
(percent at each time level)

		Division*				
Full Time Equiv. Years	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
.5	2	2	1	2	3	5
1	14	10	7	10	13	44
1.5	18	12	13	24	25	13
2	20	17	20	22	19	20
2.5	15	25	21	15	5	3
3	17	17	20	13	23	8
3.5	6	10	8	3	3	3
4 or More	9	7	10	10	9	5
N.	338	59	82	91	64	39

*Actual values differ significantly from expected values at .01 level on chi-square test..

the divisions in how many years candidates put into this process. The life and physical scientists take longest, with the time used decreasing as one moves through social science and humanities to education. About 60 percent of the life and physical scientists have used two to three full time years, while equivalent proportions of students in social science cluster at 1.5 to 2.5 years and in humanities at one to two (A substantial 23 percent of humanities candidates, however, have spent 3 years writing the dissertation.) Over three quarters of the candidates in education have used 1 to 2 years writing the dissertation, a very large 44 percent taking only one.

The only other factor, other than mere membership in a particular division, that appears to explain these differences is the proportion of the student's doctoral program that is devoted to the dissertation. As Table VII-19 shows, the largest numbers of candidates in each division devote 41-60 percent of their graduate work to the dissertation. But a fourth to a third of the candidates in life science and physical science devote 61-80 percent of their work to it, while a third or more of the candidates in social science, humanities and education devote only 21-40 percent of their graduate work to the dissertation.

How these differences relate to the number of full time equivalent years spent on the dissertation is shown in Table VII-20. Over three quarters of the candidates for whom the dissertation constitutes 20 percent or less of their doctoral program have taken 1.5 years or less

TABLE VII-19

Proportion of Candidates' Doctoral Program Devoted to Dissertation

(percent at each percent level)

		Division*				
Percent of Program	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
0 - 20	9	4	3	10	13	17
21 - 40	28	15	21	33	34	38
41 - 60	38	41	39	40	33	33
61 - 80	20	34	27	14	18	10
81 - 100	4	6	10	2	1	2

*Actual values differ from expected values at .01 level on chi-square test.

TABLE VII-20

FTE Years on Dissertation by Proportion of Nearly Finished Candidates' Doctoral Program Devoted to It*
(percent at each time level)

FTE Years on Dissertation	Percent of Doctoral Program 0-20	21-40	41-60	61-80	81-100
.5	5	4	2	1	10
1	32	20	14	4	16
1.5	41	37	13	2	10
2	9	20	23	20	21
2.5	4	6	19	19	11
3	9	6	17	30	16
3.5	0	4	5	8	5
4 or More	0	4	7	16	11
N.	22	84	125	84	19

*Actual values differ significantly from expected values at .01 level on chi-square test.

to write it, while at the other extreme over two thirds of those devoting 61-80 percent of their program have taken two to three years. It seems clear that candidates for whom the dissertation represents a smaller proportion of their graduate work complete it faster than those for whom it represents a larger proportion. Thus candidates in the life and physical sciences, most of whom devote 40-80 percent of their work to the dissertation, take longest to write it (Appendix Table VII-9). And among the other divisions candidates who devote a smaller fraction of their graduate work to the dissertation tend to finish it in fewer full time years than those who spend a larger fraction of time.

One would expect that the stage of his work at which the candidate begins dissertation research would influence the number of full time years used writing the dissertation, as it does elapsed years in the program. But for this group of nearly finished candidates when they began their research appears to have made no significant difference, although it is important for alumni as discussed in the next section.

Alumni

The overall pattern of time spent by alumni on the dissertation shows a number of interesting differences from the candidates (Table VII-21). Not only did the alumni spend fewer full time years writing the dissertation -- almost two thirds completed it in one to two, contrasted to 1.5 to 3 full time years for that large a proportion of candidates -- but, other than division, a different set of factors exerted some influence on how long it took them. Divisional differences were similar for both sets of respondents in that life scientists and physical scientists tended to spend more time writing the dissertation than alumni in the other three divisions, and educators spent the least time of all. But for alumni the stage of the program at which they began dissertation research, age and marital status were all significant as well. Unfortunately for comparative purposes, alumni were not asked about the proportion of their graduate work devoted to the dissertation.

TABLE VII-21

Alumni Time Spent on Dissertation
(percent at each time level)

		Division*				
Full Time Equiv. Yrs.	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
.5	7	8	5	4	6	13
1	22	12	14	23	25	41
1.5	22	12	17	30	23	28
2	21	23	25	22	21	9
2.5	11	16	17	9	10	2
3	9	16	13	7	6	5
3.5	3	6	3	1	2	1
4 or More	5	6	6	4	6	1

*Actual values differ significantly from expected values at .01 level on chi-square test.

The earlier alumni began their research the more time they took to complete their dissertation. Thus almost half of those who began their dissertation work in the later stages of their couse work or afterward completed the dissertation in 1 to 1.5 full time equivalent years, but only around a third of those who began in the early or mid-course stages did so (Table VII-22).

TABLE VII-22

Alumni Time Spent on Dissertation by When Started Research

(percent at each time level)

	Stage at Which Began Research				
Full Time Equiv. Yrs.	Early Course	Mid Course	Later Course	After Course	After Candidacy
.5	11	8	4	6	6
1	17	17	26	23	25
1.5	13	20	22	26	24
2	25	21	21	20	21
2.5	10	14	13	9	11
3	13	12	7	10	9
3.5	6	4	3	0	1
4 or More	5	4	4	6	3

*Actual values differ from expected values at .01 level on chi-square test.

These differences are accounted for almost entirely by variation in the common practice of the different divisions. Life and physical science alumni started their dissertation research in the early or mid-course stage to a much greater extent than alumni in the other divisions, while almost all of the social scientists, humanists and educators begin in later course stage or afterward. Within the divisions, except life sciences, when students began their dissertation research had no significant effect on the number of full time years they spent on it.

Similarly, the influence of age on number of full time years spent on the dissertation reflects the age differentials among the divisions rather than significant differences between age and time spent on the dissertation within the divisions. The values in Table VII-23 differ significantly from what would be expected from a random distribution, but the dimension of those differences is difficult to discern. Over half of the alumni who were 25 or less when they finished their degrees

TABLE VII-23

Alumni Time Spent on the Dissertation by Age Group*

(percent at each time level)

Full Time Equiv. Yrs.	Age Group Less than 25	26-27	28-30	31-32	33-35	36 or More
.5	8	4	10	4	6	7
1	25	22	18	23	23	26
1.5	30	24	17	19	22	25
2	19	23	23	21	26	16
2.5	16	15	12	12	10	8
3	2	8	12	11	7	10
3.5		3	3	5	1	2
4 or More	2	3	5	5	5	7
N.	64	233	327	167	145	292

*Actual values differ significantly from expected values at .01 level on chi-square test.

wrote the dissertation in 1 to 1.5 years, but so did over half of the alumni who were 36 or more when they completed the degree. Rather it is the middle age groups, 28-35, who seem to have taken somewhat longer to write the dissertation. This pattern corresponds closely with the age distribution of alumni by division. A larger fraction of alumni in the life and physical sciences were in the middle 26-30 age groups when they received the degree than was true for the other divisions, and those age groups and divisions tended to take longer to write it. By the same token, older alumni dominated the education group and the alumni in that division tended to take the least time to write the dissertation.

Marital status appears to have an interesting effect on the number of years taken to write the dissertation. As Table VII-24 shows, alumni who were married while writing their dissertations tended to complete them somewhat faster than those who were single. But in this case the "most married" divisions, which were life and physical science where 81 percent of the alumni were married at the time they were writing, were the ones

TABLE VII-24

Alumni Time Spent on Dissertation by Marital Status*
(percent at each time level)

Full Time Equiv. Yrs.	Married	Not married
.5	6	9
1	23	19
1.5	22	19
2	21	19
2.5	12	13
3	9	11
3.5	3	2
4 or More	4	8

*Actual values differ significantly from expected values at .01 level on chi-square test.

which tended to spend more time on the dissertation, rather than less. The next most married division with 77 percent, on the other hand, was education, and these alumni were faster dissertation writers than all the others. But for marital status, as for the other significant characteristics with respect to years spent on the dissertation, differences within the divisions are not statistically significant, with the single exception of life science. There, like in the total group, married alumni were likely to complete their dissertations in fewer full time years than single ones.

Optimal Duration for Dissertation Phase

We have seen that the number of years a student spends in the doctoral program is influenced by the stage at which his or her dissertation research is begun. Respondents were asked not only when this research does begin, but when they think it ought to begin, and how many full time years a student ought to spend on it. These questions will be analyzed now.

Table VII-25 shows the distribution of responses to the first question. Over two thirds of the faculty report that dissertation research begins in the later course stage or immediately thereafter, but only a little

TABLE VII-25

Starting Time for Dissertation Research*

(percent at each time)

		Division				
Faculty	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.**
Early course	3	6	3	1	3	0
Middle course	16	30	19	5	4	12
Later course	36	33	45	34	29	28
After course	33	25	24	40	48	39
After candidacy	12	6	8	19	15	21
Alumni						
Early course	12	31	15	6	7	6
Middle course	17	29	23	9	10	13
Later course	31	24	33	24	33	40
After course	24	13	19	35	26	22
After candidacy	16	3	10	26	24	19
Candidates						
Early course	10	16	15	6	6	8
Middle course	15	22	22	11	10	10
Later course	30	35	30	28	34	25
After course	28	23	23	27	36	29
After candidacy	17	3	10	28	13	28

*Actual values differ significantly from expected values at .01 level on chi-square test.

**Not significant.

over half of the candidates and alumni answered at that stage. These differences in perception are statistically significant, as is the disparity between the larger proportion of candidates and alumni than faculty who report beginning the dissertation work at the two extremes -- in the early stages of course work or after candidacy.

The prominence of the later course stage or after course stage prevails throughout the divisions, except that only 37 percent of the alumni in life science reported starting their work at those times, while the faculty proportions in social science and humanities rose to three quarters. Life science and physical science differ from the other divisions in that substantially larger proportions of alumni and candidates report beginning research in the early or middle stages of course work. Faculty in those divisions, on the other hand, report far less early starting than their students do. Only in education are there no significant differences among the respondent groups.

Two thirds to three quarters of all respondents believe that the optimal time to begin dissertation research is in the middle or later stages of course work (Table VII-26). The one exception is humanities faculty; only 53 percent of them believe this is the optimal time, another third prefer students to begin after course work. Relatively more faculty prefer the after course work starting time than either candidates or alumni (except in life science) but in two divisions, life science and education, there is no significant difference in response among the three groups.

Putting these two tables into a matrix reveals the degree of satisfaction the members of each respondent group find in the starting time they have experienced. Table VII-27 shows the starting time considered optimal according to the acutal starting time reported. The diagonals

TABLE VII-26

Optimal Time to Start Dissertation Research*

(percent at each time)

				Division		
Faculty	Total	Life** Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.**
Early course	11	19	12	5	7	7
Middle course	25	42	26	17	11	20
Later course	41	32	41	46	42	46
After course	20	5	19	26	32	20
After candidacy	4	1	2	6	8	7
Alumni						
Early course	12	26	15	6	8	10
Middle course	29	39	36	20	25	26
Later course	41	26	41	45	42	47
After course	12	8	6	19	15	12
After candidacy	6	1	2	10	10	6
Candidacy						
Early course	11	14	17	6	10	14
Middle course	32	36	39	31	25	25
Later course	41	37	32	42	48	47
After course	12	12	9	13	15	8
After candidacy	5	2	3	9	2	6

*Actual values differ significantly from expected values at .01 level on chi-square test.

**Not significant.

TABLE VII-27

Optimal Time to Start Dissertation by Actual Starting Time

(percent at actual time)

Optimal Starting Time	Early Course	Middle Course	Later Course	After Course	After Candidacy
	Actual Starting Time				
Faculty					
Early course	91	19	6	6	3
Middle course	4	72	22	12	11
Later course	0	7	67	34	36
After course	4	1	5	47	18
After candidacy	0	1	0	1	33
N.	23	103	233	217	73
Alumni					
Early course	68	9	4	5	2
Middle course	20	78	26	16	12
Later course	10	11	67	46	37
After course	2	2	3	32	18
After candidacy	0	0	0	2	31
N.	145	201	369	278	191
Candidates					
Early course	56	6	5	5	8
Middle course	32	77	29	21	15
Later course	11	13	59	48	41
After course	0	2	6	24	16
After candidacy	0	2	1	2	20
N.	71	108	221	199	122

indicate the proportion of respondents who are satisfied with the starting time they experience. Entries above the diagonal represent people who would have preferred an earlier time than the one they experienced; entries below represent those preferring a later time. The most well liked starting time for all three groups (with the exception of the 21 faculty members who prefer early course) is the middle course stage, where about three quarters of the respondents who report students' starting then also report it as the optimal time. Later course stage is almost as well liked. The proportions of satisfied respondents decline as one moves along the diagonal to later stages. Few dissatisfied respondents in any category consider a later stage optimal; that is, there are few entries below the diagonals. Most prefer the next earlier stage, except for those starting after candidacy who mostly opt for two stages earlier.

The tabulation set up by division (Appendix Table VII-10) confirms the preference for an earlier start over a later one. In humanities and education, where people typically start their dissertations later than in life and physical science, the progression along the diagonals is direct and uninterrupted. In life and physical science, on the other hand, where there are many more early starters, a somewhat smaller proportion of them prefer the earliest start than is true for those who begin in the middle course stage. Social scientists tend to be among the latest starters, and fewer than half of them who do start in the early course stage approve of that. On the other hand the social scientists who begin dissertation research after course work or after candidacy do not appear to like that arrangement in any greater numbers than do members of other divisions.

Having agreed that the optimal time to begin the dissertation is during the mid to late course work stage, the respondent groups differ as to how many full time equivalent years students should then use to complete it (Table VII-28). Faculty tend somewhat more than their students to consider a longer time period more suitable for preparation of the dissertation than a shorter time. But the differences among respondent groups are greatly overshadowed by the differences among the divisions, within which faculty-student disagreements are not always statistically significant.

TABLE VII-28

Optimal Number of FTE Years for Dissertation*

(percent at each time level)

No of years	Faculty	Alumni	Candidates
One or less	14	21	20
One and one half	20	22	19
Two	28	24	24
Two and one half	13	8	10
Three	11	8	9
More than three	6	5	5
Not relevant	8	12	13

*Actual values differ significantly from expected values at .01 level on chi-square test.

As Table VII-29 shows, well over half of all life and physical scientists believe that 2 to 3 years is the optimal amount of time to spend preparing the dissertation, while around three fourths of the social scientists and humanists believe it should be completed in 2 years or less, and two thirds of the educators think 1.5 years or less is optimal. These preferences coincide with the practice of beginning the dissertation earlier in the life and physical sciences than in other divisions.

TABLE VII-29

Optimal Number of FTE Years for Dissertation

(percent at each time level)

	Division*				
No. of years	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
One or less	6	6	27	21	43
One and one half	10	19	29	22	21
Two	24	31	23	28	15
Two and one half	18	17	5	5	2
Three	16	12	5	7	3
More than three	14	7	2	2	0
Not relevant	13	8	10	15	16

*Actual values differ significantly from expected values at .01 level on chi-square test.

The influence their own experience exerts on the judgement of alumni and candidates is indicated by the cross-tabulation in Table VII-30. There are two peculiarities of the data which reduce the levels of the column percentages. Firstly, a substantial proportion of the respondents replied that the optimality question was not relevant. Secondly, the two questions tabulated did not offer the same categories of answer beyond 3 years, so that the matrix had to be cut off at that point; the N's are shown to indicate the number of cases not cross-tabulated. Nevertheless, the table is useful to show the relative extent to which alumni and candidates consider their own experience the optimal one. By and large they do not.

TABLE VII-30

Judgement of Optimal Period for Dissertation According to Experience

(percent with each preference)

Optimal FTE years	FTE years used: One half	One	One and one half	Two	Two and one half	Three	More than three*
Alumni							
One half	12	2	0	0	0	1	
One	35	42	18	8	6	4	
One and one half	10	24	43	19	18	4	
Two	10	13	23	35	33	27	
Two and one half	5	3	3	10	17	16	
Three	7	2	2	7	13	20	
Not relevant	12	13	10	15	11	13	
N.	81	270	258	257	138	116	86
Candidates							
One half	7	1	1	1	0	0	
One	24	32	16	15	9	8	
One and one half	21	24	32	15	12	6	
Two	17	17	26	31	31	29	
Two and one half	7	4	7	8	17	15	
Three	2	6	6	6	9	23	
Not applicable	20	15	11	16	15	11	
N.	84	149	145	134	75	73	63

*Categories of answer for the two questions not comparable at more than three years. The N's are shown to indicate the number of cases not cross-tabulated.

Alumni who used 1.5 years or less tend to believe more time should be spent writing the dissertation, while those who did use more time apparently would have preferred less. This pattern of discontent prevails in most of the divisions (Appendix Table VII-11) where satisfaction is least at the extremes, that is at .5 or 2.5 or more years, and declines after 1.5 years. Life science, however, is different from the rest, in that approval of the time actually used increases slightly with each time period, and at every level up to 2.5 years life science alumni consider more time than they used to be optimal. Physical scientists, too, are more approving of longer periods spent on the dissertation than other divisions, but they appear to be most satisfied at 2 years. It is interesting that in education, where short periods of dissertation preparation are the common, and apparently approved, practice substantial numbers of those alumni who did complete the dissertation in one year or less consider more time to be optimal.

Candidates show a similar pattern to the alumni. Approval of their own experience drops after two years for candidates contrasted to 1.5 for alumni. And life science candidates, like their older colleagues, consider longer periods better, up to the three year limit of the table (Appendix Table VII-12).

Student Anxiety about Time Spent on Dissertation

Alumni

Although satisfaction with their own experience can be inferred from the foregoing cross-tabulations, alumni and candidates were, in fact, asked whether they thought they had taken or were taking too much time to complete the dissertation. Only a little over half of the alumni answered an unqualified "no" to that question (Table VII-31), a quarter of them felt they definitely had taken too much time, and a fifth answered "perhaps" they had. Alumni in physical science, social

TABLE VII-31

Alumni Feelings of Too Much Time Spent on the Dissertation
(percent with each attitude)

		Division*				
	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
No	54	59	51	50	55	62
Perhaps	20	20	21	23	17	17
Yes	25	21	27	27	28	20
No Opinion	1	0	2	0	0	1

*Actual values differ significantly from expected values at .05 level on chi-square test.

science and humanities were more likely to feel they had definitely taken too much time than were life science and education alumni, although there were considerably fewer dubious humanists than physical or social scientists.

Table VII-32 confirms alumni opinion that one to two full time equivalent years is the optimal period of time to spend preparing a dissertation. Two thirds of those who definitely did not feel they had spent too much time completed the dissertation in 1.5 years or less, while the proportion who felt they definitely had taken too long jumped from 18 percent at 1.5 years to 24 percent at 2 years, and a highly disproportionate 18 percent of alumni who felt they took too long used more than 3 years. Almost two thirds of those who thought they might have taken too long used only 1 to 2 years.

The divisional pattern is about what one would expect. Substantial numbers of life scientists did not feel they took too long until 3 or more full time equivalent years had elapsed, while a large number of educators, at the other extreme, felt that one to two years was too long, and many of those who took only one year were doubtful. Of the three remaining divisions, physical scientists began to be concerned about taking too long at two years, although half of them who took that long were satisfied. Social scientists and humanists also began to feel they had taken too long at two years, but about as many of them were doubtful or sure they had taken too long at 1.5 years as there were who thought 1.5 years was all right.

Corresponding to alumni concern about having taken too long to prepare the dissertation if more than two full time equivalent years was devoted to it was their feeling of having taken too long according to the number of elapsed years they spent in the program. Table VII-33 shows that four elapsed years in the program was the critical time at which many alumni began to feel they were taking too much time, although not until six years had elapsed were they anxious in disproportionate numbers. This pattern is displayed by the life and physical scientists, who spend most of their doctoral program in preparing the dissertation. For social scientists the critical years are five and six. Among humanists, who traditionally spend the longest number of years obtaining the Ph.D., six elapsed years is the time when the proportion feeling they have taken

TABLE VII-32

Alumni Feelings of Too Much Time by FTE Years Actually Spent on Dissertation*

(percent at each time level)

		FTE Years						
Total	N.	One half	One	One and one half	Two	Two and one half	Three	More than three
No	670	10	30	23	18	9	7	3
Perhaps	249	3	18	21	23	16	13	6
Yes	302	3	10	18	24	14	13	18
All	1221	7	22	22	21	11	9	8
Life Science **								
No	100	10	14	10	28	19	12	7
Perhaps	34	3	9	21	18	15	23	12
Yes	36	8	11	8	14	11	19	28
All	170	8	12	12	23	17	16	12
Physical Science								
No	178	7	19	24	24	12	10	4
Perhaps	74	3	12	8	27	23	19	8
Yes	90	3	6	11	23	22	11	23
All	342	5	13	17	25	17	13	10
Social Science								
No	128	5	34	31	16	5	6	2
Perhaps	61	3	18	29	28	13	7	2
Yes	69	1	9	26	28	13	10	13
All	258	4	24	29	22	9	7	5
Humanities								
No	137	10	38	22	19	7	4	1
Perhaps	40	0	10	28	22	22	8	10
Yes	65	2	9	20	26	11	11	22
All	242	6	26	23	21	10	6	8
Education								
No	123	19	47	26	3	2	1	2
Perhaps	35	6	46	29	9	3	9	0
Yes	39	3	20	28	26	3	18	3
All	197	14	41	27	9	2	6	1

*Actual values differ significantly from expected values at .01 level on chi-square test.

**Not significant

TABLE VII-33

Alumni Feelings of Too Much Time by Elapsed Years in the Ph.D. Program*

(percent at each time level)

	Elapsed years						
Total	One - three	Four	Five	Six	Seven	Eight	Nine or more
No	30	29	21	9	5	2	4
Perhaps	14	25	25	15	10	5	6
Yes	4	15	16	21	15	10	19
All	20	22	21	14	9	5	9
Life Science							
No	25	42	23	6	2	1	1
Perhaps	18	39	27	9	6	0	0
Yes	3	22	11	27	16	13	8
All	19	37	21	11	6	4	2
Physical Science							
No	34	32	19	8	2	2	2
Perhaps	15	36	23	16	5	4	1
Yes	3	25	18	24	15	5	10
All	21	31	20	14	7	3	4
Social Science							
No	18	30	29	13	5	3	2
Perhaps	2	12	39	17	17	7	7
Yes	3	11	23	23	19	7	14
All	10	21	29	17	12	5	6
Humanities							
No	31	27	19	11	4	3	5
Perhaps	5	17	19	14	19	12	14
Yes	1	4	9	18	16	18	34
All	18	19	16	14	10	8	15
Education							
No	42	14	15	6	10	2	11
Perhaps	37	17	11	17	6	0	12
Yes	10	12	15	15	7	10	32
All	34	14	15	10	8	3	16

*Actual values differ significantly from expected values at .01 level on chi-square test.

too long jumps while the percentage of those who are satisfied drops. Educators show a less clear pattern; the proportion of satisfied alumni drops at four years, but those who feel they took too long are quite evenly and proportionately distributed across the spectrum of elapsed years, except for nine or more.

Just as age was significantly associated with how long alumni took to write the dissertation, so it is significantly related to their feelings of having taken too long to do it. Not many alumni who were under 28 years of age when they received the degree felt they had spent too much time on the dissertation, but over a fourth of those aged 28-30 thought they had, and almost a third of each succeeding age group felt they had definitely taken too long (Table VII-34).

TABLE VII-34

Alumni Feelings of Too Much Time Spent on Dissertation by Age*

(percent with each attitude)

		Age group					
	All	25 and under	26-27	28-30	31-32	33-35	36 and over
No	54	82	67	48	50	50	49
Perhaps	20	12	19	23	20	18	20
Yes	25	6	12	27	30	32	31
No opinion	1	0	2	1	0	0	0
N.		65	238	330	168	149	297

*Actual values differ significantly from expected values at .01 level on chi-square test.

This pattern prevails quite consistently throughout the divisions (Appendix Table VII-13). Age apparently brings greater anxiety to finish the dissertation expeditiously, although, as pointed out earlier, the division in which a student works (along with its characteristic age pattern) is more influential on how long he actually takes than is age per se.

The final factor significantly associated with alumni feelings of having spent too much time on the dissertation was the source of their personal support (Table VII-35). Those most concerned about taking

TABLE VII-35

Alumni Feelings of Too Much Time Spent on Dissertation by Source of Personal Support*

(percent with each attitude)

				Source of support				
	All	Pers. earn.	Spouse	Fell./ schl.	T.F.	R.A.	Loans	Parent
No	54	50	56	62	51	48	87	64
Perhaps	20	18	21	21	22	20	0	14
Yes	26	32	21	17	27	30	13	21
No opinion	0	0	1	0	0	2	0	0
N.		388	117	290	135	149	8	14

*Actual values differ significantly from expected values at .01 level on chi-square test.

too long were the alumni dependent upon personal earnings or supported by research assistantships. Barely half of each of these answered a definite "no", while almost a third said "yes", they did take too long. Students on regular fellowships or scholarships were the least concerned; 62 percent of them said "no" and 17 percent "yes". Although this pattern holds quite consistently throughout the divisions, differences within divisions are not statistically significant (Appendix Table VII-14). Apparently the overall differences in concern reflect the divisional variations in thecommonly utilized means of support. For example, education alumni were dependent upon personal earnings while in the program, while life scientists were more heavily supported by fellowships. Nevertheless, within each division alumni depending upon personal support or teaching or research assistantships (whose importance varied with division) were more likely to feel they had taken too much time than those on straight fellowships or scholarships. Humanists supported by spouse's earnings also had little concern for taking too much time; many of these may have been older married women, supported by established husbands.

Candidates

Although the year in which they received the doctoral degree made no significant difference in alumni feelings of having taken too long to write the dissertation, current candidates differ greatly from their older colleagues in this attitude. As Table VII-36 shows, only one third of the candidates answered "no" to this question, contrasted to 54 percent of the alumni, while almost twice as many candidates as alumni, 43 percent contrasted to 25 percent, definitely feel they are spending too much time on the dissertation. Only among the people who think they may be spending too much time are the proportions comparable. Furthermore, these large differences between candidates and alumni prevail throughout the divisions. They may be explained in part by the greater anxiety of current candidates who worry that the work is going too slowly, while alumni, in comfortable retrospect, do not recall the anxiety so vividly nor believe at the present time that they did take too long. On the other hand, the evidence indicates that current candidates are, in fact, using more full-time equivalent years to complete the dissertation than alumni did. Compare Tables VII-18 and VII-21.

TABLE VII-36

Candidates' Feelings of Too Much Time Spent on the Dissertation
(percent with each attitude)

		Division*				
	Total	Life Sci	Phys. Sci	Soc. Sci	Human.	Educ.
No	32	46	32	26	30	28
Perhaps	23	21	28	24	17	23
Yes	43	30	39	48	50	47
No opinion	2	3	1	2	3	2

*Actual values differ significantly from expected values at .05 level on chi-square test.

The concern that candidates as a group feel about taking too long is significantly related to how many full-time equivalent years they had already used for the dissertation when they answered the questionnaire. They become disproportionately concerned about the matter at 3 years, contrasted to the break point of 2 years for alumni (Table VII-37).

TABLE VII-37

Candidate Feelings of Too Much Time by FTE Years Actually Spent on Dissertation*

(percent at each time level)

	N.	One half	One	One and one half	Two	Two and one half	Three	More than three
		FTE Years						
No	242	13	24	24	19	9	11	0
Perhaps	165	13	27	16	20	12	5	7
Yes	321	8	15	19	19	12	12	15
All	741	11	21	20	19	11	10	8

*Actual values differ significantly from expected values at .01 level on chi-square test.

But this time reference is entirely a function of which diviison the candidate works in. Within divisions the candidates' responses do not differ significantly according to how many years they have already used. On the whole they seem to feel anxious about taking too long no matter how long they actually take.

Candidates appear to relate their feelings of taking too long to complete the dissertation more strongly to the number of elapsed years they have spent in the Ph.D. program. As Table VII-38 shows, when six years or more have elapsed a disproportionate number of them answer "yes", they are spending too much time, although the percentage who answer "no" drops precipitously after four years. Moreover, this association is significant for three of the five divisions. The number of candidates in life science, physical science and social science who are apparently satisfied with the amount of time they are taking drops at five years and the number who feel that they are definitely taking too long becomes disproportionately large at six years. With regard to elapsed time in the program, then, candidates' attitudes are more like the alumni than in the case of full time years spent on the dissertation.

TABLE VII-38

Candidate Feelings of Too Much Time by Elapsed Years in Ph.D. Program*

(percent in each time level)

	Elapsed years						
Total	One-three	Four	Five	Six	Seven	Eight	Nine or more
No	33	34	14	10	6	2	2
Perhaps	21	35	17	11	9	3	4
Yes	9	16	17	19	18	10	11
All	20	26	16	14	12	5	6
Life Science							
No	38	44	12	4	2	0	0
Perhaps	26	57	17	0	0	0	0
Yes	12	27	18	15	12	6	9
All	27	42	15	6	4	3	3
Physical Science							
No	36	43	11	6	2	0	2
Perhaps	28	30	17	15	10	0	0
Yes	11	20	16	26	15	7	5
All	25	30	15	16	9	3	3
Social Science							
No	18	37	20	8	12	3	2
Perhaps	7	40	26	10	12	2	3
Yes	2	13	18	22	24	9	12
All	8	25	21	15	18	6	7
Humanities **							
No	31	21	15	25	4	2	2
Perhaps	30	18	4	15	11	11	11
Yes	10	14	16	14	19	13	14
All	20	17	14	17	13	9	10
Education **							
No	54	17	4	8	8	4	4
Perhaps	35	35	0	10	5	5	10
Yes	22	15	17	18	8	10	10
All	34	20	9	13	8	7	8

[*] Actual values differ significantly from expected values at .01 level on chi-square test.

[**] Not significant.

Also like the alumni, candidates 28 and over are significantly more concerned about taking too long to write the dissertation than the younger students are (Table VII-39). But among candidates over 30 more than half answered "yes" to this question, contrasted to less than one-third of alumni who did. This is another indication of the greater anxiety current candidates feel than did graduates of earlier years. Age is statistically significant within only two of the divisions (Appendix Table VII-16). In social science there is a clear shift in attitude at age 28, after which over half the candidates feel they are taking too long; in humanities (significant at the .05 level) this occurs at age 30.

TABLE VII-39

Candidate Feelings of Too Much Time Spent on the Dissertation by Age*

(percent with each attitude)

		Age Group					
	All	25 and under	26-27	28-30	31-32	33-35	36 and over
No	32	67	41	31	25	31	23
Perhaps	23	13	32	24	16	15	25
Yes	43	20	26	43	57	54	50
No opinion	2	0	2	2	2	0	3
N.	744	46	133	220	110	86	149

*Actual values differ significantly from expected values at .01 level on chi-square tes

The source of their personal support is an important factor for candidates, as it was for alumni (Table VII-40). Half of those depending on their own or their spouse's earnings feel they are taking too long, as do 60 percent of the candidates on loans. And, like the alumni, those on straight fellowships are the least concerned about taking too long. But in all cases the proportion of candidates answering "no" is substantially lower than alumni, and the "yes" answers are up to twice as frequent. In all the divisions candidates depending upon their own or their spouse's earnings, and to a slightly lesser extent those on teaching fellowships, are more concerned than the students on straight fellowships, but only in social science are these differences statistically significant (Appendix Table VII-17).

TABLE VII-40

Candidate Feelings of Too Much Time Spent on the Dissertation
by Source of Personal Support*
(percent with each attitude)

		Source of Support					
	All	Pers. earn.	Spouse	Fel. or schl.	T.F.	Loans	Parents
No	31	24	27	45	35	13	27
Perhaps	23	19	22	31	21	27	14
Yes	44	54	49	24	42	60	28
No opinion	2	2	2	1	3	0	0
N.	677	300	113	170	72	15	7

*Actual values differ significantly from expected values at .01 level on chi-square test.

Causes of Delay

We have seen that something like half the doctoral student body feels that it is or may be taking too long to prepare the dissertation (and, by inference, complete the degree), and that these feelings are more intense among older students, who have spent more than 2 full time equivalent years writing the dissertation and more than 4 elapsed years in the program. The question remains as to what causes some students to be delayed while others are not. Thirteen factors were presented to each of the three respondent groups, and they were asked to rate each on a scale ranging from "not important" through "somewhat important" and "important" to "very important". Unfortunately, the respondents were not asked to rank these delay factors and the differences in perception that show up in the ratings make comparisons among respondent groups rather difficult. Most of the candidates and alumni rated all 13 factors unimportant. Perhaps as individuals they rated "very important" or "important" the one or two factors that they considered delayed them personally and marked the rest unimportant. Moreover, there is a substantial body of students and former students who have not felt unduly delayed and would not, therefore, consider these factors important. Faculty, on the other hand, viewing the whole array of students they have counseled, apparently drew generalizations that distributed their answers more normally across the rating scale.

Given these limitations in comparability of the responses, Table VII-41 shows the proportion of each respondent group which rated the factors "very important" and "important" combined, and "not important", arrayed in the rank order suggested by those proportions. In most cases only 2-4 percent of the respondents reported "no opinion". Faculty registered "no opinion" to a greater extent, up to 12 percnet, on a number of items which called for more subjective student answers, such as lack of personal support funds, which faculty probably felt they could not adequately judge.

There are two factors to which all three respondent groups give the highest priority as causes for delay: difficulty in reducing the topic to manageable proportions, which comes out in first rank for faculty and candidates and a close second for alumni; and selection of an unexpectedly complex research problem, which candidates and alumni rated about as highly, but which drops to fifth place for faculty. A third factor, lack of needed research skills, achieved first place for alumni and fourth for faculty, while candidates' ratings put it in sixth place. Nevertheless, insofar as any consensus emerges from this question these three problems may be considered the most acute. The ratings given difficulty in reducing the topic are consistent with the opinion expressed earlier by many respondents that the expected scope of the research problem is an aspect of the dissertation in need of revision or reform (see Chapter V, pp. V8-V9).

The disparities between faculty and students in the top five rankings are as interesting as their agreement. Faculty apparently consider inadequate motivation and personal problems second and third in importance, while both candidates and alumni rate inadequate motivation "not important". Alumni are almost equally certain that personal problems are not important in causing delay, while candidates' ratings give that one a middle position. While, in the opinion of students, faculty may overrate inadequate motivation and personal problems, apparently they underrate financial problems. Candidate and alumni ratings place lack of personal

TABLE VII-41

Rating of Factors Causing Delay in Completing the Ph.D.

	Rating			
	Very Import. & Important		Not Important	
	Rank	Percent	Rank	Percent
Faculty				
Difficulties in reducing topic	1	53	12	11
Inadequate motivation	2	49	9	15
Personal problems	3	46	13	8
Lack of needed research skills	4	45	11	13
Selection of unexpectedly complex problem	5	42	10	14
Inadequate preparation for research	6	40	8	19
Lack of personal financial support	7	38	4	28
Difficulty in finding sufficiently import. topic	8	36	6	25
Insufficient guidance from chairman	9	35	7	20
Unrealistic perfectionism	10	32	5	26
Lack of research funds	11	23	1	44
Unduly long preparation for prelims	12	22	3	37
Inability to work with advisor	13	14	2	40
Alumni				
Lack of research skills	1	22	12	46
Difficulty in reducing topic	2	21	13	45
Selection of unexpectedly complex problem	3	20	11	55
Lack of personal financial support	4	19	6	65
Difficulty in finding sufficiently import. topic	5	16	9	59
Unrealistic perfectionism	6	16	10	57
Inadequate preparation for research	7	15	8	60
Insufficient guidance from chairman	8	14	7	65
Lack of research funds	9	12	3	73
Unduly long preparation for prelims	10	12	5	68
Personal problems	11	12	8	70
Inadequate motivation	12	8	2	77
Inability to work with chairman	13	6	1	86
Candidates				
Difficulties in reducing topic	1	33	13	31
Selection of unexpectedly complex problem	2	32	12	35
Lack of personal financial support	3	31	7	56
Unrealistic perfectionism	4	28	11	41
Lack of research funds	5	24	4	59
Lack of needed research skills	6	24	10	41
Personal problems	7	20	9	53
Insufficient guidance from chairman	8	20	8	55
Inadequate preparation for research	9	20	6	57
Difficulty in finding sufficiently import. topic	10	18	3	59
Unduly long preparation for prelims	11	17	2	64
Inadequate motivation	12	14	5	58
Inability to work with chairman	13	7	1	80

financial support in the 3rd and 4th ranks, respectively, and candidates place lack of research funds 5th (9th for alumni), while faculty ratings place lack of research funds first in order of "not important" and lack of personal funds 4th. Candidates and alumni are of mixed minds on these financial questions, however, because lack of personal funds also achieved middle rankings of 6 and 7 in order of "not important", while lack of research funds ranked 3 and 4. Apparently, for some students these are critical factors, but for the majority they are unimportant.

There are a few divisional differences that might be pointed out (Appendix Table VII-18). Faculty and alumni in life science differ from their colleagues in other divisions in the importance they ascribe to insufficient guidance from the chairman. This problem was also considered more important by candidates and alumni in physical science than by their cohorts in other divisions. Lack of personal financial support was given higher ratings by faculty in social science and humanities than by their colleagues in other divisions, and humanities alumni ratings gave this problem first place for that group. Lack of needed research skills was given top ratings by candidates in life science and physical science. Alumni in social science and faculty in education blamed inadequate preparation for research to a much greater extent than their cohorts. It was the humanities alumni who had the severest problems with unrealistic perfectionism, while lack of research funds was more important for education alumni than for graduates of other divisions. Finally, education faculty consider difficulty in finding a topic of sufficient importance a major cause for delay.

There is agreement among all three groups that three of the five most unimportant factors are: inability to work with the chairman, unduly long preparation for the preliminary examination and lack of research funds. One aspect of inability to work with the chairman was pursued further in a question posed to alumni and candidates as to how often, if at all, their progress toward the degree was slowed by delays in reading and criticism of written materials they handed in. Their answers are shown in Table VII-42.

TABLE VII-42

Delay in Reading and Criticism of Students' Written Work*

(percent at each frequency)

		Division				
Alumni	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Never	67	71	73	65	59	66
Once in a while	25	22	21	28	29	27
Often	8	7	6	8	12	7
Candidates						
Never	61	77	70	53	62	49
Once in a while	29	16	22	34	30	38
Often	10	6	9	13	8	13

*Actual values differ significantly from expected values at .01 level on chi-square test.

Apparently candidates as a whole are somewhat more delayed by the reading and criticism of their work than alumni were, but this varies considerably by division. In life science and humanities a slightly larger proportion of candidates than alumni answered "never", while fewer answered "once in a while" or "often". For candidates in the other three divisions, however, delays are encountered more often from these causes than was true for alumni. The shift is especially marked in social science and education. Despite these divisional variations, half to three quarters of doctoral students are not at all impeded by delays in reading and criticism of their work.

In addition to the tabulated causes of delay offered the respondents, they were each given an opportunity to elaborate on reasons they considered important. The overwhelming preponderance of the comments, from faculty, alumni and candidates in every division -- indeed, in virtually every department -- identified employment in a job while writing the dissertation as the major problem. In most instances they were referring to full time jobs, but some found part-time work, especially teaching, very demanding. Aside from the time-consumptive disadvantages of employment, an element of demoralization with respect to the dissertation is experessed by several candidates. One Chemical Engineer simply states that he is unlikely to finish because he is working full time off campus to support his family . A student in Social Work and Psychology states that "after prelims I could no longer tolerate being 'a student'" so took a full time research job where he is treated as a professional. A candidate in French was unable to find a job in her field, so lost the motivation to finish, and took a job in a personnel office, which gives her neither the time nor energy to finish.

Many of the same respondents who cite employment as a cause also specified that their jobs require them to complete the dissertation in absentia, a very grave disadvantage. This was reported as well by a number of people who did not otherwise identify the job itself as a problem, but deplored the lack of communication with and guidance from faculty that distance imposed. Students commenting on the disadvantages of working on the dissertation in absentia are more likely to be in social science, humanities and education than in life and physical science.

Although insufficient guidance from the chairman ranked fairly low in the objective ratings, this and related faculty shortcomings were also identified as important causes of delay. Two faculty members, in Mechanical Engineering and American Culture, cited the advisor's failure to check up on students' progress. Candidates complained more of indifference and lack of interest and support on the part of the faculty, and included the committee members as well as the chairman in this assessment. It was succinctly identified by a student in Electrical Engineering as "No one gives a damn." Several candidates in humanities and social science complained that insufficient guidance at the outset got them off to a bad start in terms of topic selection, deadlines and the committee's criteria for what a dissertation is and what it is not. An Education candidate cited lack of honesty by the advisor about what was wrong with the dissertation in its early stages. A History candidate analyzed the problem of faculty time in a little greater depth, pointing to what he sees as the reluctance of faculty to spend time on candidates when they, themselves, must publish or perish. He suggests that the University must decide whether it wants to produce good Ph.D.s or good faculty.

Technical problems that impede progress fall into two categories. Specialized field work is one, cited by students and faculty in Botany and Zoology for whom it is seasonal, Anthropology and Art History for whom extended periods of long distance travel are required. One professor of Environmental and Industrial Health also pointed out the complexities of work in new areas of research. The other set of technical problems relates to the student's own preparation for a complex research task. Candidates in Aeronautical Engineering, Physics, Educational Psychology and Anthropology all cited their unpreparedness, either in terms of training or experience. So does a Professor of Dentistry.

In addition to problems in research techniques and methodology, a number of respondents identified difficulties in writing up their research results, in learning to "write well enough to convey an unambiguous message", in the words of one alumnus. It is not merely a matter of writing style, although that is important, but also a problem of motivation to put it all down on paper. A History professor recognizes that students bog down at the writing stage when they tire of the grind and financial and family problems arise. An alumnus in Forest Management reports that he simply "ran out of gas" at the editing stage. And a candidate in Education describes his feeling that "Writing the dissertation is like beating on a dead horse. The research is finished; the results are known; the excitement is gone!"

Personal and family problems are mentioned by both faculty and candidates. Several faculty members are aware of students' marital difficulties, while candidates tend to identify, in addition, a sense of individual demoralization. One candidate in History describes the dissertation as a lonely experience, which reduces motivation, and a student in English declares that he lost his motivation when he realized his chairman was too preoccupied with his own affairs and did not appreciate the candidates' work. Two professors of Electrical Engineering identify the personal crisis as a search for maturity.

Faculty in several departments and divisions point out that there is a small number of students who use the dissertation to avoid life, who try to stay at the University as long as possible. A professor of Electrical Engineering distinguishes three kinds of slow-moving students: those doing excellent work and trying several areas who need to be left alone; those who are good in class but will never do original research and need to be turned off and sent away; those perpetual studnets who love to learn but are afraid to leave the womb. Two candidates describe this category in more flattering personal terms. One in Natural Resources says he is not anxious to "obtain Ph.D. in a hurry. Consider working on dissertation as one of the activities (teaching, professional...) presently involved in", and a candidate in Mechanical Engineering asserts that "I am determined to enjoy life. I will not work day and night month after month." An alumnus in Sociology admits that he "Goofed around", that he needed pushing and nobody pushed. A professor of Nuclear Engineering points out, on the other side of the inertia argument, that "A few exceptionally good studnets stay simply due to broad interests and involvement with others' problems -- e.g. very real scholars." A Mechanical Engineering professor suggests that excessive financial support keeps students extending their work, while one in Romance Languages identifies the opposite phenomenon, that students delay completion because they cannot get jobs.

In addition to identifying major causes of delay in completion of the dissertation, a number of respondents offered solutions to those problems. With respect to dissertation writing in absentia two alumni suggest that if strong encouragement of completion on campus doesn't work a systematic follow-up scheme should be devised. A candidate in Botany takes a much stronger position: "Do not allow a candidate to leave unless degree complete." A candidate in English suggests that prospective mothers should finish the dissertation first. One in Music Education recommends beginning the dissertation during the course work phase so that if a student must leave campus he is off to a good start. A Physics candidate recommends the early start on general principles, as do alumni in Botany, Clinical Psychology and Geography. To overcome technical research and writing difficulties a faculty member in Education proposes advanced seminars in research, a candidate in Aeronautical Engineering would like a short course on style and composition, and alumni in Zoology, Romance Languages, Speech and English all believe that inexperienced students would benefit from small research projects preliminary to the dissertation. A faculty member in Atmospheric and Oceanic Science proposes that every dissertation taking three years or more be carefully examined by the Graduate School because some chairmen regard students as cheap labor. Finally, to cope with financial problems a professor of Geography proposes that financial support be guaranteed all students on admission to candidacy, on condition that they complete the thesis within twelve months, and that faculty be required to give their full assistance and guidance to make this possible; a candidate in Romance Languages is certain that if students were given a one-year thesis fellowship, most would finish in that time.

Shortening the Dissertation Phase

Given the concern people express about the amount of time spent in the dissertation process all three respondent groups were asked whether that phase of the degree program should be shortened. Their replies are tabulated in Table VII-43. A majority of the faculty do not think the dissertation phase should be shortened, and 45 percent of the alumni agree with them, but only a little over a fourth of the candidates are of this opinion. Another fourth of the candidates think the dissertation phase should definitely be shortened, while the largest number is undecided but inclined to shortening. Almost as many alumni fall into this undecided category, while fewer than 15 percent of alumni and faculty think the time should definitely be shortened.

Faculty in the divisions which characteristically take the longest time to complete the dissertation, life and physical sciences, and the division in which they are written most quickly, education, are the most emphatic, that this phase of the Ph.D. process should not be shortened. On the other hand, only about half of the social science and humanities faculty share this opinion. The alumni do not differ so sharply with one another across divisions, while candidates are in much greater agreement across division lines than the other two groups.

The disagreement is greatest between candidates and faculty in education. Alumni occupy a middle ground here, as they do in all the divisions, but in each one their views are closer to the faculty than to the candidates. By and large the greatest agreement among respondent groups is found in

TABLE VII-43

Desirability of Shortening the Dissertation Phase*

(percent with each opinion)

	Total	Division				
		Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Faculty						
No	59	66	62	50	53	67
Maybe	25	23	26	24	27	21
Yes	11	7	8	19	14	5
No opinion	5	4	4	7	6	7
Alumni						
No	48	57	47	43	33	50
Maybe	35	29	35	37	37	35
Yes	13	9	11	14	18	9
No opinion	7	5	7	6	12	6
andidates						
No	27	33	27	26	26	20
Maybe	38	38	40	37	41	39
Yes	28	21	26	32	25	33
No opinion	7	8	8	6	8	8

*Actual values differ significantly from expected values at .01 level on chi-square test.

social science, where the largest faculty proportion answered "yes", and the smallest number of faculty answered "no". The candidates in this division were also among the most emphatic for change, while among alumni the humanists were the most enthusiastic for shortening.

Faculty were asked to comment on the desirabilty of shortening the dissertation phase. Their remarks fall into two categories: those which assert that the dissertation is essential, but could be pursued more efficiently; and those which suggest de-emphasizing it. In the first group fall the people who are concerned that shortening the process might sacrifice quality and who feel that there is a need actually to raise standards. A professor of Zoology who takes this position recommends an earlier start as one solution. A professor of Aeronautical Engineering declares that the dissertation is the most important phase, and that the problem of excessive duration could be solved by shortening the pre-candidacy period. A colleague in Mechanical Engineering, on the other hand, suggests that "A pre-candidacy project will get most students off to a running start -- and test his interest." A professor of Zoology lays the problem at the feet of advisors who fail to keep their students moving along, speculating that there is probably a close identity between long-term students and particular advisors. Finally, in this group are several professors, from Zoology, Journalism and American Culture, who believe that the solution lies in a financial aid system that will enable students to keep at the dissertation.

Among faculty who would deemphasize the dissertation as it has traditionally been executed are a professor of Chemistry who would make it optional, faculty in History and Music who recommend shortening the document itself, a professor of American Culture who declares that dissertations should be less formal and pretentious, and an Electrical Engineer who suggests shortening the formal residence period and allowing Ph.D. research to be conducted in the industrial setting with faculty supervision. A kind of middle ground is represented by a professor in the biological sciences who says "Lengthen research aspect -- shorten the crap!" and one in Political Science who suggests in more dignified and discursive tones "If the process of defining the problem, creating data and designing measures and techniques and performing the initial or more central parts of the analysis remain undisturbed" there could be less emphasis on writing.

Although most of the faculty do not believe the dissertation phase should be shortened, only 30 percent of them answered negatively to the proposal of a maximum time limit for working on the Ph.D. (Table VII-44). Candidates, on the other hand, who expressed considerable interest in shortening the dissertation phase, are not enthusiastic about imposition of a time limit; over half of them answered "none" on that question. Alumni response was similar to the faculty, both groups favoring a 5, 6 or 7 year limit, with the faculty more strongly preferring 7 and the alumni opting in the largest numbers for 5. Candidates who favor a limit distribute quite evenly from 2 to 7 years. By and large these respondent differences prevailed throughout the divisions, which on this question,

TABLE VII-44

Desirability of a Maximum Time Limit for Working on the Ph.D.*

(percent approving each maximum)

		Division				
	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Faculty**						
None	30	22	34	29	36	23
Two-four	9	6	8	5	18	12
Five	16	19	17	15	13	16
Six	15	20	15	21	6	5
Seven	23	26	23	22	20	33
Eight or more	4	4	3	5	5	10
Alumni						
None	34	21	34	40	33	37
Two-four	10	8	10	6	13	14
Five	19	27	20	14	20	16
Six	15	22	16	14	13	11
Seven	16	16	13	21	16	18
Eight or more	5	6	7	6	5	4
Candidates						
None	54	42	47	64	56	54
Two-four	11	15	12	8	12	13
Five	10	18	13	6	9	8
Six	8	11	13	8	3	6
Seven	10	8	10	9	11	15
Eight or more	6	6	5	5	9	4

*Actual values differ significantly from expected values at .01 level on chi-square test.

**Rows do not add to 100 because several faculty cases were miscoded.

too, differ significantly from one another. Humanities faculty are the most strongly opposed to a limit, while among alumni and candidates the social scientists are the most emphatic. It is the physical scientists in all three respondent groups who are most amenable to a limit.

The extent to which candidates oppose or favor a maximum time limit on attainment of the Ph.D. is significantly associated with their feelings about taking too long to write the dissertation. (There is no such association for alumni.) As Table VII-45 shows, those who are most anxious about taking too long oppose most strongly the imposition of a time limit,

TABLE VII-45

Candidates' Opinion on Time Limit for Ph.D. According to their Feelings of Taking too Long*
(percent with each opinion)

	Taking too Long		
Time Limit in Years	No	Perhpas	Yes
None	43	58	62
Two-Four	11	10	12
Five	12	8	9
Six	11	8	6
Seven	17	10	6
Eight or more	5	6	6

*Actual values differ significantly from expected values at .01 level on chi-square test.

62 percent, contrasted to 43 percent of the candidates who do not feel they are taking too long but also oppose the limit. Among candidates who do favor a limit there does not appear to be much difference in the number of years they favor according to their anxiety about taking too long, except that those who are least anxious are most favorably inclined to a long 7-year maximum. The same kind of pattern shows up in the divisions, but the differences within those divisions are not statistically significant.

Summary

The number of years alumni spent in the doctoral program was influenced largely by the division in which they studied, the age at which the degree was attained, possession of a Master's Degree upon entering the Ph.D. program, the program stage at which dissertation research was begun, and the extent to which the student was employed while preparing the dissertation. The majority spent five elapsed years or less in the program, four full time equivalent years. About half considered themselves full time studnets. Life and physical scientists younger students on the average, who were most likely to be studying full time, most likely to work part time if they worked at all, and most likely to begin the dissertation research early, completed the program in the shortest elapsed time period. Social scientists and humanists were the slowest in the program, and were also more likely to work and to work full time, usually started their dissertation research later, and in humanities tended to be older. Education alumni were the oldest and most part time students, worked the longest hours, and tended to start their dissertation research at a later stage than many others, yet disproportionate numbers of them completed the program quickly.

The same variables are associated with the number of years candidates are spending in the doctoral program, and the same kind of divisional differences prevail, but the relationship between full time employment and longevity in the program is less clear for candidates than for alumni. Candidates are more likely than alumni to work full time, especially in the middle and older age groups. Relatively fewer candidates than alumni have a Master's Degree when they begin doctoral work. But how long candidates take to produce the dissertation depends mainly on the fraction of their graduate work devoted to it, and this in turn, varies by division.

Thus students in life science and physical science, whose graduate programs are substantially devoted to writing the dissertation and who start working on it earliest take the longest actually to write it, but they take fewer elapsed years in the program, which they follow in a more concentrated full time manner than members of other divisions. At the other extreme, students in humanities and, to a lesser degree, in social science, who take a longer more part time doctoral program in terms of elapsed years, use a smaller fraction of it to write the dissertation, which they begin later and work on for a shorter period of time. Education candidates are different from all the others in that they are the most part time, but take the least number of years both in the program and in writing the dissertation, which they begin late, devote the least proportion of their work to, and finish quickly.

The fastest dissertation writers among the alumni, who were also the fastest in the program, the oldest, the most intensively employed, the second most married and the latest starters onthe work, were also the educators. All of these variables -- age, marital status and stage at which research was begun -- were significant influences on alumni dissertation time. Those who spent the most time writing the dissertation were the "middle aged", most married, but least intensely employed, earliest starting and shortest program dwelling life and physical scientists. Social scientists and humanists who took the longest elapsed period to get through their doctoral programs, showed a middle position on most of these characteristics, including years spent on the dissertation.

Although the majority of students begin their dissertation research during the later part of their course work or after its completion, most of the respondents consider the optimal time to begin is the middle or later stages of course work. A little under half of each group considers 1.5 to 2 full time equivalent years the optimal time period for writing a dissertation, but faculty are more inclined to favor a longer period than are candidates or alumni. Life and physical scientists opt for two to three years, social scientists and humanists generally prefer two years, and educators think 1.5 years optimal.

About 25 percent of alumni felt they had taken too much time to complete the dissertation, especially if they had taken more than two full time equivalent years to do it, spent more than four or five years in the doctoral program, were over 28 years of age when they received the degree, and were dependent upon personal earnings or research assistantships for their support while in graduate school. Relatively, many more candidates than alumni feel they are taking too long. Candidates are most likely to be concerned if they have already spent 3 full time equivalent years on the dissertation, and six years in the program, are over 28 years of age and are dependent upon personal earnings of self or spouse for support.

Major causes for delay in completing the dissertation are considered to be difficuly in reducing the topic to manageable proportions, selection of an unexpectedly complex research problem, and lack of needed research skills. Faculty also consider inadequate motivation and personal problems important, while candidates and alumni rate financial problems highly. In the free commentary, full time employment and dissertation preparation in absentia were most frequently identified as causes of delay. Candidates are much more favorable than faculty or alumni to shortening the dissertation phase, but faculty and alumni are more favorable to imposing a time limit of five to seven years.

VIII

EVALUATION OF SELECTED GRADUATE SCHOOL AND DEPARTMENTAL POLICIES

A number of the evaluation questions in the survey included general topics relating to the doctoral program as a whole as well as the dissertation phase, and certain aspects of Graduate School and departmental policy. A set of questions, asked of faculty only, related to the burden of responsibility they carry for doctoral supervision. These assorted topics will be examined now.

Criticisms of the Ph.D. Program

One way to discern the satisfaction of respondents with the doctoral program is to place before them a set of commonly expressed criticisms of that program and ask to what extent they agree, disagree, or have no opinion. Seven generalized criticisms were presented in the questionnaire, three dealing with the program as a whole and four with the dissertation phase.

The three statements about the program are presented in Table VIII-1. A majority of each respondent group disagrees with all the statements. The faculty disagrees most strongly with the assertion that doctoral study places to much stress on research, to the detriment of other professional skills, while the alumni are even more emphatic than the faculty in their disagreement that the intellectual scope of doctoral training is too narrow and that students' potential for creative thinking and individual expression are not developed. Half or more of the candidates, on the other hand, agree or strongly agree that these criticisms are valid.

These kinds of differences between faculty and alumni on the one hand and candidates on the other, show up throughout the divisions, but within divisions the contrasts vary with the question (Appendix Tables VIII-1 -- VIII-3). The educators all tend to agree that doctoral study places too much emphasis on research while respondent disparities are greatest in life science on this statement. In social science a sub-

TABLE VIII-1

Selected Criticisms of Doctoral Program

(percent with each opinion)

Opinion	Faculty	Alumni	Candidates
	Doctoral Study Places too Much Stress on Research to the Detriment of Other Professional Skills*		
Strongly agree	4	4	11
Agree	13	17	28
Disagree	47	48	35
Strongly disagree	29	20	12
No opinion	7	11	13
	Intellectual Scope of Doctoral Training is too Narrow*		
Strongly agree	6	5	10
Agree	23	20	26
Disagree	47	48	42
Strongly disagree	15	19	11
No opinion	9	8	11
	Student's Potential for Creative Thinking and Individual Expression Not Developed*		
Strongly agree	3	4	9
Agree	14	13	18
Disagree	49	44	42
Strongly disagree	20	31	16
No opinion	15	8	15

*Actual values differ significantly from expected values at .01 level on chi-square test.

stantial one third of the faculty does agree that the intellectual scope of doctoral training is too narrow, yet this proportion still diverges widely from candidates. Similarly, humanities alumni are more inclined than usual to agree with candidates that the program does not develop students' creative potential, but both represent far larger numbers than faculty who feel that way. Candidates in life science and social science, on the other hand, do not feel as strongly as their colleagues in other divisions that their creativity is not being developed. There is an interesting divergence of opinion on this latter question in education. Almost a third of the faculty think creativity is not developed, but substantial majorities of the candidates and alumni think that it is.

In another place on the questionnaire respondents were asked to evaluate current practice with respect to the fostering of student creativity on a four point scale. Table VIII-2 shows less divergence between faculty and candidates when the question is phrased this way, although the differences among respondent groups are statistically significant. Furthermore well over a third of each group believes these practices do need improvement or revision. And on this question alumni and candidates differ little across all the divisions in the proportion who desire reform, while faculty in humanities are least enthusiastic and those in education are most favorable. The dichotomy between faculty and students in education remains as noted above.

TABLE VIII-2

Evaluation of Practices Regarding Fostering of Student Creativity*

(percent with each opinion)

		Division				
Faculty	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Good	14	16	11	10	21	9
Adequate	37	35	40	37	37	30
Could be improved	35	37	40	31	27	41
Needs revision	9	8	6	14	7	15
No opinion	5	4	2	8	8	4
Alumni						
Good	19	23	14	20	18	21
Adequate	36	39	37	34	36	35
Could be improved	28	27	28	31	24	26
Needs revision	6	4	5	5	10	10
No opinion	11	7	16	10	12	8
Candidates						
Good	12	12	10	8	19	16
Adequate	31	34	36	31	25	27
Could be improved	29	32	24	30	30	30
Needs revision	12	14	8	14	12	12
No opinion	16	8	22	18	15	16

*Actual values differ significantly from expected values at .01 level on chi-square test.

Responses to the four statements about the dissertation phase of the program are tabulated in Table VIII-3. The suggestion that dissertation research is directed to the advisor's interests at the expense of student creativity clearly does not apply to most situations; candidates are equally strong in their denial as faculty,and alumni are even more so. In life and physical science, however, there is a substantial one fourth of the candidates who agree or strongly agree with this statement, and in physical science one fifth of the faculty does also, although in that division another fifth avoided the issue with "no opinion". (Appendix Table VIII-4)

TABLE VIII-3

Selected Criticisms of the Dissertation Phase

(percent with each opinion)

	Faculty	Alumni	Candidates
Dissertation Research Directed to Advisor's Interest at Expense of Student Creativity*			
Strongly agree	2	3	5
Agree	12	7	11
Disagree	46	38	45
Strongly disagree	25	45	27
No opinion	15	7	12
Dissertation Research is too Specialized for Current Student Needs*			
Strongly agree	3	2	6
Agree	12	11	21
Disagree	53	51	45
Strongly disagree	21	27	12
No opinion	12	9	16
Dissertation Research Should be More Relevant to Career Needs*			
Strongly agree	7	12	13
Agree	27	26	33
Disagree	37	29	25
Strongly disagree	12	14	7
No opinion	17	19	22
Dissertation Phase Should be Revised to take Account of Reduced Demand for Ph.D.s*			
Strongly agree	6	20	20
Agree	16	26	31
Disagree	33	18	17
Strongly disagree	27	17	8
No opinion	19	20	24

*Actual values differ significantly from expected values at .01 level on chi-square test.

Although three-quarters or more of faculty, and alumni disagree that dissertation research is too specialized to meet the current needs of students, a fourth or more of the candidates in all divisions agree or strongly agree with the statement. Stated a little differently, the proposition was put to the respondents that dissertation research should be more relevant to the career needs of students. More than a third of the faculty and the alumni agree or strongly agree with this statement, while candidates' concurrance runs to 46 percent. Higher proportions of "no opinion" are registered by all three groups than for any question discussed so far, however. Although the differences among divisions on this question are not statistically significant, the most emphatic division is education, where over half the faculty as well as 60 percent of the candidates agree or strongly agree with the statement.

As to whether the dissertation phase should be revised to take account of the reduced demand for Ph.D.s, there is again considerable divergence between faculty opinion on the one hand and candidates and alumni on the other. Slightly over half of the candidates and alumni agree or strongly agree (one fifth of each group strongly agrees), while only a fifth of the faculty feels this should be done. A fifth to fourth of each group registers "no opinion", however. The divisions do not differ significantly on this question either.

The quantitative responses on these last two statements are supported by the extended remarks of the respondents. Most of them focus on the need for responsiveness to the reduced market demand for Ph.D.s by limiting admissions and elevating standards, thereby enhancing quality as well. This view comes from faculty, alumni and candidates in all divisions except education. Concern for maintenance and elevation of dissertation standards is expressed in connection with reduced output of Ph.D.s and independently of it. Faculty, in particular, see the need for recognition of the diversity of individual programs through flexibility in requirements and regulations imposed by graduate administration. A professor of Zoology declares that "Doctoral work is an individual phenomenon" so that decisions as to which procedures are best depends on the individual. Students are more concerned about their own understanding of existing program and dissertation standards in order that they may conform to what is expected from them by faculty.

Faculty in Geography and Microbiology also voice concern about the tendency to overspecialization, as does an alumnus in Zoology. Other generalized comments refer to the need for more encouragement to interdisciplinary students (an alumnus in Social Psychology), more "humaneness and care for student sensibilities" (candidate in Education) approach to the dissertation that is more interactive between students and faculty (candidate in Education), less emphasis on the dissertation and prelims and more on "directed study and faculty/student/industry interactions" (candidate in Applied Mechanics). For the most part, however, people are satisfied with the program and an alumnus in Botany expresses his impatience with the "sore losers" who blame the program for their own weaknesses.

Graduate School Policies

Several faculty members expressed their opinion on the questionnaire that the selectivity of students is crucial to the success of a Ph.D. program, yet almost half the group is critical of the admissions procedures currently in force (Table VIII-4). Fewer alumni and candidates than faculty call for improvement or revision in these procedures, but 20 and 23 percent of them registered no opinion on the subject. The faculty in education are particularly distressed about admissions procedures -- three quarters of them ask for improvement or revision. Faculty in physical science and humanities are the most satisfied; nevertheless 45 percent of them recommend reform. Insofar as the commentary refers to specific policies it favors tighter admissions procedures to "screen out those not qualified by reason of intellectual capacity or interest", as a professor of Civil Engineering put it. An alumnus in Business Administration believes that only mature, creative and dedicated people should opt for a Ph.D.; since formal training cannot make an individual creative, the university must be very selective of its doctoral students and finance them well. A candidate in Biochemistry asserts simply that graduate admissions should be trimmed back.

TABLE VIII-4

Evaluation of Procedures for Admission to Ph.D. Program*

(percent with each opinion)

		Division				
Faculty	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Good	17	18	17	18	16	9
Adequate	32	28	38	28	36	17
Could be improved	33	32	33	30	33	44
Needs revision	16	20	12	18	12	30
No opinion	2	3	0	5	2	0
Alumni						
Good	14	13	14	18	13	11
Adequate	31	25	35	34	29	26
Could be improved	26	31	29	20	28	25
Needs revision	9	9	7	6	11	14
No opinion	20	22	15	22	19	23
Candidates						
Good	10	8	10	9	14	10
Adequate	24	20	31	23	22	22
Could be improved	30	33	35	27	28	25
Needs revision	14	19	14	13	13	9
No opinion	23	20	10	28	22	33

*Actual values differ significantly from expected values at .01 level on chi-square test.

Faculty are also critical of candidacy regulations (Table VIII-5), although a fifth or more of them offered no opinion on this subject. Twenty-eight percent, however, consider these regulations inadequate and 22 percent rate them insufficiently flexible. Even the customarily critical candidates do not feel quite as strongly on this subject and alumni are considerably less critical, but larger proportions of the student groups declined to express an opinion. Education faculty are most anxious for changes, over a third of them marking "needs revision" (Appendix Table VIII-1), while life science faculty are the most satisfied.

TABLE VIII-5

Evaluation of Candidacy Regulations*

(percent with each opinion)

Adequacy	Faculty	Alumni	Candidates
Good	11	14	9
Adequate	40	47	47
Needs revision	28	13	24
No opinion	21	26	20
Flexibility			
Too little	22	12	21
About right	48	50	37
Too much	2	2	3
No opinion	28	36	39

*Actual values differ significantly from expected values at .01 level on chi-square test.

Reasons for faculty dissatisfaction with candidacy regulations emerge from their extended remarks. In the words of a professor of English the present sharp division between pre-candidacy and candidacy "is an intellectual disaster." Members of the CICE and Mathematics faculties agree, and go on to say that the course and dissertation phases should overlap, that students in candidacy should be allowed to take courses. A professor of Classical Studies recommends that the categories of provisional and augmented candidacies be dropped.

It is on the subject of fee structure, however, that the faculty is indeed irate. "It is", in the words of an English professor, "an abomination". Faculty from many departments in every division except Education declare that the fee structure is catastrophic to advanced seminars and courses, that it is, in fact, "demolishing our program of advanced courses", according to one Physics professor, and discouraging good students from attending the University. Professors from several departments point out the fee structure encourages students to establish candidacy as soon as possible, which cuts short their course work and results in their taking courses during candidacy, an expensive arrangement for them, or auditing these courses, with no credit to either the student or the faculty members teaching them. An English professor observes that the quality of dissertations has declined as the fee schedule destroyed advanced seminars. Students are only slightly less vehement in their attack on the fee system. One candidate in Mechanical Engineering points out that the policy discourages students from advanced courses, while students in Speech and History feel that the University is not "granting degrees -- I consider it selling them", for a price of $1000.

The faculty offer only a few concrete proposals for reform. One Political Science professor suggests elimination of a registration fee for the dissertation defense and substitution, perhaps, of a flat dissertation fee equal to the actual costs of processing through the Graduate School. A professor of Physiology proposes that out of state tuition be eliminated for graduate students, and an Electrical Engineering professor asks for more effort by the Graduate School to raise funds for student support. A candidate in Psychology states bluntly that the absentia enrollment fee should be abolished. Students from several departments in social science and humanities propose that candidates' fees be scaled to their use of University facilities, such as $50-$100 per term for library privileges, more for the use of laboratories. An alumnus in Art History suggests that fees should be refunded when an advisor fails to respond to dissertation submissions.

Faculty and candidate opinions about the fee structures are quantified in Table VIII-6. Alumni were not asked this question. Less than a third of the faculty and candidates rate the fee structure either adequate or good, or consider it appropriately flexible. About the same proportions of faculty had no opinion, but fewer candidates failed to record an opinion on the adequacy of the fee structure than on any other policy evaluation. It appears that the extended comments and the quantitative responses on this subject are mutually supportive. Within divisions faculty and candidates do not differ significantly on this question, but the divisions differ from one another (Appendix Table VIII-2). Social scientists are the most emphatic in their negative opinions, while physical scientists tend to be the least critical.

Alumni and candidates were asked an open-ended question about what they consider to be the appropriate role of the Graduate School in

TABLE VIII-6

Evaluation of Fee Structure*

(percent with each opinion)

Adequacy	Faculty	Candidates
Good	7	6
Adequate	24	27
Needs revision	43	51
No opinion	26	17
Flexibility		
Too little	28	35
About right	31	22
Too much	8	6
No opinion	33	37

*Actual values differ significantly from expected values at .01 level on chi-square test.

the administration of doctoral research. Most important is the monitoring or watchdog function, not only over program standards, but more importantly over the behavior of chairmen, committees and departments. A candidate in Bio-Chemistry, seconded by one in Speech and Theatre, pleads that "help is needed in liberating students from dictator-like control of chairman." Students in Chemical Engineering and Romance Languages call less dramatically for Rackham to uphold minimum standards of performance which are flexible and stimulate creativity, and to protect students from unreasonable department demands. A candidate in History carries the responsibility a bit further: "Provide leverage to open backwater departments . . .to . . . methods in other fields . . . monitor grad curriculum." A more active role in interdisciplinary programs is requested by an alumnus in Nuclear Engineering and a candidate in Art History. Students also see an important role for Rackham as an arbiter of differences between students and faculty -- a court of appeals. This role was identified by alumni and candidates in life science, humanities and education.

A rather lengthy comment by a faculty member in Mechanical Engineering effectively sums up much of the expression about Rackham's role. He suggests that wise faculty hiring and tenure policy and the attraction of good students are the real solutions to problems raised in the questionnaire. Rackham's well intended efforts to enforce standards conflict with the view that the dissertation is a personal thing, to be structured by the chairman and the student with the consent of the committee. Rackham should be limited to: administrative matters and fees, standards for the written document, and the responsibility to see that committee members take their role seriously and prepare meaningful evaluations.

The open-ended question also served to stimulate critical comments concerning Rackham and its role. It is generally felt that Rackham should "keep out" of the administration of doctoral research. This role should be left to the departments. Some respondents consider Rackham regulations trivial and irrelevant. Many find it inefficient and in the words of a Botany alumnus, "perenially confused" about fees, credit load, absentia registration, etc. Others use language such as "impersonal" and "inhumane." A candidate in Computer Science asks "Is anyone up there listening? What do you do, anyway? Who has even met the Dean?" "The imposition of Rackham ... is undue and inhumane punishment" (candidate in Chemistry), the personnel were arrogant (alumnus in Art History), the "final procedures enforced by Rackham are insulting, artibrary, and unnecessarily time-consuming" (Physics candidate). Nor is it only students who take this view. A professor of Physics finds that the Graduate School is "autocratic, delighting in retroactive regulation changes", while colleagues in Urban and Regional Planning and Zoology request "more flexibility and humanity [at the] final hassle with Rackham", and an Art History professor suggests that "Rackham needs to develop more sensitivity to individual student needs -- to get rid of the mentality that everybody is trying to 'beat the system'."

On the other hand, not all commentators join in this severe criticism. A candidate in Natural Resources expresses the hope that this review (that is, the present study) will not result in greater bureaucratic control, but will preserve the present flexibility. Another, in Romance Languages, reports that through the long years of doctoral study he has appreciated the communication and thoughtfulness of Rackham.

Departmental Practices and Policies

Integration of Research and Course Work

Of all the procedural components of the dissertation phase which were evaluated in the questionnaire the one that is considered least successful is the integration of dissertation research and course work. Half or more of the faculty and alumni and almost two thirds of the candidates believe this component needs improvement or revision (Table VIII-7). Candidates show the most consistency in their opinions across

TABLE VII-7

Evaluation of Integration Between Doctoral Research and Course Work*

(percent with each opinion)

		Division				
Faculty	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Good	12	15	12	11	10	11
Adequate	32	34	36	22	42	20
Could be improved	42	39	41	46	39	57
Needs revision	8	8	7	12	5	13
No opinion	5	5	3	10	4	0
Alumni						
Good	12	14	12	10	9	14
Adequate	26	39	27	24	24	21
Could be improved	40	32	41	41	41	40
Needs revision	13	6	10	15	15	20
No opinion	9	9	10	10	11	5
Candidates						
Good	7	8	8	5	7	10
Adequate	19	17	24	17	18	22
Could be improved	42	43	40	40	43	47
Needs revision	22	23	21	27	19	14
No opinion	[illegible]	9	7	11	13	7

*Actual values differ significantly from expected values at .01 level on chi-square test.

the divisions. Among alumni the largest majority in favor of reform occurs in education, while life scientists report satisfaction with this component. Faculty are quite divided on the issue in life and physical science, but in social science and education they favor revision or improvement by two to one.

Students had very little to say on this subject in the free remarks. A candidate in Psychology feels that students at the thesis stage are isolated from others and the faculty tends to bestow upon them a benign neglect. Another in the same department finds the dissertation hard to do unless it is a part of paid work; he suggests it be integrated either into course work or an assistantship. A Music candidate thinks more pedagogical course work is needed along with supervised teaching experience. A History candidate on the other hand, proposes the elimination of course work, except independent reading and study for prelims; course work should take place in the context of collaborative faculty-student projects. On a more positive note, an alumnus in Zoology expresses great satisfaction with the department's policies which stress breadth, courses in research that allow trial labs, rigorous screening, and students' research independent of the advisor's.

Faculty express more concern about integration between course work and research than students do. Much of that concern has already been discussed in connection with candidacy regulations, as most faculty see the difficulty lying there. In further proposals one Psychology professor suggests "Split 990 and 995 credits into sections allowing formal credit for advanced seminars both for students and teachers." A professor of Biochemistry considers it very important that 990 and 995 be graded, not allowed pass/fail. A Romance Language professor, on the other hand, believes 990 and 995 should be abolished because they "are a sham for collecting a graduation fee.". And two other professors, one in Zoology and one in Education, declare that there should be less course work altogether. A History professor proposes that "Instead of orals stressing simultaneous mastery of fields of knowledge, students should be required to defend three disparate seminar papers to be graded after open sessions", then advance to dissertation research.

Candidate Participation in Evaluation of Departmental Requirements

The question of whether candidates should be regularly consulted in the evaluation of departmental requirements for the doctoral degree elicited very few negative responses. As Table VIII-8 shows, the candidates are most certain, at 70 percent, that this should be a regular policy, but half the faculty and alumni agree with them, while more than a third of those two groups would qualify the circumstances of participation. Approximately the same order of difference among respondent groups prevails among the divisions. Physical

TABLE VIII-8

Candidate Participation in Evaluation of Requirements*

(percent with each opinion)

		Division				
Faculty	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ**
No	12	10	18	9	9	9
In some cases	37	33	31	31	36	44
Yes	51	57	60	60	54	47
Alumni						
No	3	7	15	8	6	7
In some cases	27	49	43	34	41	32
Yes	70	44	42	58	53	61
Candidates						
No	9	1	3	3	4	6
In some cases	40	25	40	16	30	33
Yes	51	74	57	81	66	62

*Actual values differ significantly from expected values at .01 level on chi-square test.

**Not significant among respondent groups.

scientists are least inclined to favor this kind of student participation. Indeed, almost a fifth of the faculty are opposed to it and only a little over half the candidates are unqualifiedly favorable. In social science, at the other extreme, 60 percent of the faculty are fully supportive and another third favor with qualifications. Life scientists are not far behind social scientists in their support for this kind of policy.

Alumni were asked the further question as to whether they were satisfied with the influence they or their student cohorts had had on degree requirements. About half of them responded that their feelings were neutral on this subject (Table VIII-9), but another fifth were dissatisfied or very dissatisfied. Consistent with their response on the previous question, social scientists register the largest proportion of dissatisfied alumni, but humanities shows the largest percentage of very dissatisfied respondents. Combining these two levels yields a proportion of about one fourth of the alumni in each of social science, humanities and education who were dissatisfied with the influence they exerted on degree requirements. Life science reported the highest levels of satisfaction.

TABLE VIII-9

Alumni Satisfaction with Influence on Degree Requirements*

(percent with each attitude)

	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Very dissatisfied	4	3	3	4	7	5
Dissatisfied	17	14	15	21	16	18
Neutral	47	43	54	38	49	44
Satisfied	28	32	25	32	24	28
Very satisfied	4	8	3	5	4	5

*Actual values differ significantly from expected values at .05 level on chi-square test.

The distribution by graduate year of alumni responses on the previous question, "Should candidates be regularly consulted in the evaluation of departmental requirements", indicates that alumni have altered their views over the years and that current candidate positions reflect a continuation of the trend (Table VIII-10). Within only one division, however, is this trend clearly discernable and statistically significant. That is physical science, the division least favorable currently to student participation, but the one whose alumni have most consistently altered their views.

TABLE VIII-10

Alumni Opinion on Candidate Participation in Evaluation of Requirements by Graduation Year

(percent with each opinion)

	Graduation Year		
	1962 & earlier	1963-67	1968 & since
No	12	12	6
In some cases	45	42	37
Yes	43	46	57

Along with the change in alumni opinion about student participation in evaluation of departmental degree requirements, the degree of satisfaction they felt about their influence on these matters varies with the year in which they completed the degree (Table VIII-11). Whereas over half of those who graduated before 1968 were neutral on this

TABLE VIII-11

Alumni Satisfaction with Influence on Degree Requirements by Graduation Year*

(percent at each level)

	Graduation Year		
	1962 & earlier	1963-67	1968 & since
Very dissatisfied	4	5	4
Dissatisfied	12	14	21
Neutral	55	54	40
Satisfied	25	24	30
Very satisfied	5	3	5

*Actual values differ significantly from expected values at .01 level on chi-square test.

question, only forty percent take that position among the most recent graduates. And it appears that a large portion of the formerly neutral alumni moved into the dissatisfied group, which rose from 12 percent of the pre-1963 graduates to 21 percent of those who completed the degree after 1967. One might conclude that as students became more conscious of a desire to participate such institutional changes as occurred satisfied some but were insufficient for others.

Faculty Dissertation Responsibilities

Most of the survey questions were directed to the relationship of the student to the doctoral program and the dissertation phase. One set of questions, however, addressed the matter of faculty burdens and responsibilities in dissertation supervision. Table VIII-12 shows current frequency of dissertation chairmanships for the entire responding faculty. About a third of them are not presently chairing any committees, while another third chairs two to three, a fifth chairs only one, and the rest are scattered above three committees. The burdens, in terms of number of dissertation chairmanships, are more lightly borne by faculty in life and physical sciences. Forty percent of the faculty in the former currently chair no committees, contrasted to only 25 percent of the education faculty at the other extreme. At the upper

TABLE VIII-12

Number of Committees Currently Chairing*
(percent at each number)

		Division				
	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
None	32	40	32	28	30	25
One	19	14	24	22	14	15
Two	18	21	21	14	18	12
Three	13	11	12	13	17	13
Four	7	6	5	8	8	10
Five	8	6	5	11	11	10
More than five	3	2	1	4	2	15

*Actual values differ significantly from expected values at .01 level on chi-square test.

levels of five or more chairmanships 25 percent of each of the social science and education faculties carry that many, contrasted to only 6 or 8 percent of life and physical science.

One might expect the weight of these responsibilities to increase with rank and, as Table VIII-13 shows, in a general way it does. Half the assistant professors do not currently chair committees, contrasted to a third of the associates and a fourth of the full professors. But at one or two chairmanships there are no large differences among ranks, and at three the difference is between assistant professors and the rest. At four or more chairmanships, the numbers increase directly with rank.

TABLE VIII-13

Number of Committees Currently Chairing by Rank*

(percent at each number)

			Number of Committees				
	None	One	Two	Three	Four	Five	More than fiv
Assistant professor	50	24	15	3	4	3	1
Associate professor	31	15	23	17	6	5	2
Full professor	25	20	18	14	8	11	4

*Actual values differ significantly from expected values at .05 level on chi-square test.

These differences are accounted for largely by divisional membership, as the differences among ranks are statistically significant in only two of the divisions, humanities and education (Appendix Table VIII-1). In physical science assistant professors are assigned to several committees almost as often as tenured ranks. In humanities, on the other hand, only a third of the assistant professors chair committees and associate professors are likely to chair fewer committees than full professors do. Education has too few assistant professors to analyze, but in this division, as in humanities, full professors generally chair more committees than associate professors do.

The faculty were asked whether their departments recognize service on dissertation committees when determining faculty workloads. Fifty-nine percent reported some form of recognition, mostly informal, but the remaining 41 percent responded "no, not in any way" (Table VIII - 14). Life science and humanities are the least considerate of these factors, while in education two thirds reported that committee membership is accounted for in informal ways. Social science departments appear to have the most formal and explicit criteria for recognizing dissertation committee service.

TABLE VIII-14

Department Recognition of Committee Service
(percent at each level)

	Total	Division*				
		Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
No	41	51	41	31	50	25
Yes, informally	44	33	58	31	48	64
Yes, through formula	15	16	1	38	2	11

*Actual values differ significantly from expected values at .01 level on chi-square test.

When the question was pursued further, in terms of whether the extent of workload recognition in the department is appropriate, less than half the faculty answered that it is (Table VIII-15). Most of the rest replied that more credit is needed, 16 percent emphasizing that much more credit should be given. Rank made no difference in faculty opinion on this subject, but division did. Education faculty, who appear to carry the heaviest burdens of numerous simultaneous chairmanships, are the least satisfied. Social science, the division with the most structured procedures for recognition, is also the most

TABLE VIII-15

Appropriateness of Workload Recognition
(percent with each opinion)

	Total	Division*				
		Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
No, much more credit needed	16	20	13	13	11	36
No, more credit needed	37	38	39	27	49	34
Yes, credit adequate	46	39	48	57	40	30
No, less credit appropriate	1	3	0	3	0	0

*Actual values differ significantly from expected values at .01 level on chi-square test.

satisfied. In life science, where the largest proportion answered "no" on the question of departmental recognition of committee service, a substantial one fifth of the faculty believes that much more credit should be given and only 39 percent is satisfied. This division follows closely after education in dissatisfaction.

The final question asked of faculty concerning their workload was whether they believe the number of doctoral students per faculty member should be regulated in any way. One third of them answered "no", while another fourth answered an unqualified "yes" (Table VIII-16). The distribution of these responses by division corresponds with the attitudes expressed on the previous questions. Life science and education faculty most strongly favor regulation: physical scientists are least favorable.

TABLE VIII-16

Regulation of Number of Students per Faculty Member
(percent with each opinion)

		Division*				
	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
No	33	27	44	36	25	17
Under certain conditions	43	36	44	41	50	50
Yes	24	37	12	23	25	33

*Actual values differ significantly from expected values at .01 level on chi-square test.

The faculty were asked to comment further on this subject. The consensus of opinion holds that the number of doctoral candidates a faculty member can handle, either as a chairman or committee member, is an individual matter, best left to his or her discretion. Yet the tendency for popular chairmen to be pressured into taking more students than they can comfortably supervise, combined with the tendency for enthusiastic faculty to overrate their own capacity, are problems that must be dealt with. A professor of Zoology suggests that the overload student be advised of his position and make his own choice to put up with the difficulties that are likely to arise. Another aspect of the popular chairman problem, mentioned by faculty members in such diverse fields as Zoology and Romance Languages, is that less demanding chairmen who can't say no will accept sub-standard students and maintain them in the program when perhaps they should be dropped. That is considered a strong argument in favor of limitation on numbers. A professor of Mathematics suggests another favorable argument: there should be some protection for students, who have a right to see their advisors often. A professor of Education sees the numbers problem from the opposite end of the spectrum, and suggests that every one should be required to serve on a prescribed [minimum] number of committees or have his salary reduced. A Zoology professor spoke for several others, in humanities and social science as well, when he said resolution of the question "depends strongly on recognition of dissertation work as part of total workload" in the department.

Although students and former students were not asked, several of them expressed their concern for these faculty problems on the free commentary. An alumnus in English believes observation should be made as to which chairmen are doing the best job, as their individual efforts are more important to students than formal policies and procedures. An Applied Mechanics candidate asks departments to "Define and implement criteria for assessing qualifications of faculty ... to ... direct dissertations." A graduate in Geography recommends that more time be provided to professors for thesis supervision. Candidates in Social Science and Speech are more specific in suggesting that faculty should get teaching credit for committee service so that they can spend more time at it, and there should be limitations on the number of dissertations supervised. Finally, a candidate in Education proposes that more incentives, including financial, be offered professors to serve on committees.

Summary

The responses to seven statements of criticism indicate that candidates are most critical of the doctoral program, but faculty tend to be more critical than alumni. Nevertheless, no strong demand for reform emerges.

Majority opinion in all three groups disagrees with the most severely critical statements about the program, and in some cases the majority is very large. The minorities that agree with these criticisms often run from a fourth to a third of the group, however, so that more consideration might be given to reform on those issues, especially in divisions where agreement with these criticisms appears strongest. The most controversial issues appear to be whether dissertation research should be more career-oriented and whether the dissertation phase should be revised to take account of current employment conditions.

Graduate School policies related to candidacy regulations and fee structure arouse strong crticism, especially from faculty. They suggest that the effect of the existing policies is to destroy advanced seminars and lower the quality of doctoral work. Department practices most in want of reform relate to the integration of course work and dissertation research. Most respondents believe there is insufficient integration, the candidates being more emphatic than the others. Reform in this area is most highly favored in education, least favored in Physical Science.

Most respondents believe candidates should be regularly consulted in the evaluation of departmental requirements. About a fifth of the alumni were dissatisfied with the influence they exerted, especially in social science, humanities and education; the more recent graduates feel more strongly about candidate participation and are inclined to be less satisfied with their experience.

Most faculty serve as chairman of several committees simultaneously, especially if they are associate or full professors in humanities and education. Up to half of them do not perceive any mechanism for departmental recognition of committee service, especially in life science and humanities, and over half the faculty believes more credit should be given for such service, especially in life science and education. Faculty in those two divisions are especially favorable to regulations limiting the number of doctoral students per faculty member.

APPENDIX A

DETAIL TABLES

APPENDIX TABLE III-1

Age of Alumni When Received Degree, by Graduation Year

(percent in each graduation year)

Graduation Year	N.	Age Group 25 and under	26-27	28-30	31-32	33-35	36 and over
Total							
1962 or earlier	242	6	20	21	14	14	25
1963-67	354	6	20	24	13	14	24
1968 and since	649	5	18	30	14	10	24
Life Science							
1962 or earlier	31	7	26	26	6	13	23
1962-67	51	8	25	22	20	12	14
1968 and since	90	7	20	32	18	10	13
Physical Science							
1962 or earlier	83	12	28	26	17	11	6
1963-67	116	7	33	29	13	6	12
1968 and since	149	6	19	42	16	8	9
Social Science							
1962 or earlier	54	2	28	20	13	18	19
1962-67	64	8	16	25	14	16	22
1968 and since	145	5	28	32	12	9	14
Humanities							
1962 or earlier	41	2	5	22	15	17	39
1963-67	73	1	10	22	12	21	34
1968 and since	135	4	18	22	16	11	29
Education							
1962 or earlier	31	0	3	3	13	10	71
1962-67	46	4	2	13	7	20	54
1968 and since	125	2	5	19	9	12	54

APPENDIX TABLE III-2

Marital Status of Alumni by Graduation Year

(percent in each status)

		Division				
	Total	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Married						
1962 or earlier	80	84	78	72	82	94
1963-67	76	80	84	73	71	65
1968 and since	77	80	79	76	73	77
Not Married						
1962 or earlier	19	16	21	24	18	6
1963-67	23	20	16	22	29	35
1968 and since	20	19	19	20	22	18
Other						
1962 or earlier	1	0	1	4	0	0
1963-67	1	0	0	5	0	0
1968 and since	3	1	0	4	5	6

APPENDIX TABLE III-3

Personal Support of Alumni by Graduation Year

(percent using each source)

		Source of Support					
	N.	Pers. earn.	Spouse earn.	Flshp/ schl.	Teach felshp.	Res. asst.	Loans & parents
Life Science							
Before 1963	26	19	0	42	19	12	4
1963-67	45	16	13	53	11	7	0
1968 or later	76	18	13	47	15	4	3
Physical Science							
Before 1963	71	25	3	30	16	25	1
1963-67	96	20	4	27	9	39	1
1968 or later	133	16	11	31	12	28	2
Social Science							
Before 1963	49	33	8	27	10	22	0
1963-67	58	36	12	29	9	14	0
1968 or later	129	35	12	32	9	9	3
Humanities							
Before 1963	34	38	18	15	23	0	6
1963-67	68	50	13	13	21	2	1
1968 or later	120	42	22	15	18	2	1
Education							
Before 1963	23	87	0	4	9	0	0
1963-67	42	62	7	17	9	5	0
1968 or later	116	66	8	14	3	5	4

APPENDIX TABLE III-4

Personal Support of Alumni by Age

(percent in each age group)

	Age Group					
Life Science	25 or under	26-27	28-30	31-32	33-35	36 and over
Personal earn.	0	9	15	12	23	43
Spouse earn.	0	11	10	20	6	9
Felshp. or schlshp.	67	56	46	60	41	30
Teach. felshp.	33	24	15	0	12	9
Research asst.	0	0	10	4	12	9
Loans & parents	0	0	3	4	6	0
N.	9	34	39	25	17	23
Physical Science						
Personal earn.	13	11	12	23	38	48
Spouse earn.	4	10	9	2	8	4
Felshp. or schlshp.	52	34	27	31	8	26
Teach. felshp.	9	13	16	10	4	7
Research asst.	21	30	35	31	38	15
Loans & parents	0	3	1	2	4	0
N.	23	71	105	48	26	27
Social Science						
Personal earn.	17	8	41	45	48	49
Spouse earn.	0	7	12	20	10	15
Felshp. or schlshp.	67	47	23	21	24	15
Teach. felshp.	17	12	10	3	3	7
Research asst.	0	24	12	7	14	12
Loans & parents	0	2	2	3	0	2
N.	12	59	68	29	29	41
Humanities						
Personal earn.	13	21	28	41	56	63
Spouse earn.	12	21	22	25	15	15
Felshp. or schlshp	38	18	16	13	18	8
Teach. felshp.	25	36	32	9	12	13
Research asst.	0	4	2	3	0	0
Loans & parents	12	0	0	9	0	1
N.	8	28	50	32	34	72
Education						
Personal earn.	33	60	31	53	64	83
Spouse earn.	0	20	21	0	8	3
Felshp. or schlshp.	33	20	24	23	0	8
Teach. felshp.	0	0	10	6	12	5
Research asst.	33	0	3	12	4	1
Loans & parents	0	0	10	6	12	0
N.	3	5	29	17	25	102

APPENDIX TABLE III-5

Age, Sex and Marital Status of Alumni Who Received Financial Aid

(percent)

	Total				Life Science				Physical Science				Social Science				Humanities				Education			
AGE*	%/All	Fell	TF	RA	%/All	Fell	TF	RA	%/All	Fell	TF	RA	%/All	Fell	TF	RA	%/All	Fell	TF	RA	%/All	Fell	TF	RA
Less than 25	5	11	8	4	7	8	14	0	8	14	6	5	5	11	10	0	3	9	4	0	2	4	0	12
26-27	19	27	26	25	22	26	38	0	26	27	25	23	24	39	33	42	13	16	23	33	4	4	0	0
28-30	26	27	37	35	28	25	29	44	33	32	47	40	29	22	33	24	22	25	36	33	15	29	30	12
31-32	14	15	8	14	15	21	0	11	16	17	11	16	13	8	5	6	15	12	7	33	9	17	10	25
33-35	12	9	7	14	12	10	10	22	8	2	3	11	12	10	5	12	15	19	9	0	14	12	10	38
More than 36	24	12	16	8	16	10	10	22	9	8	6	4	16	9	14	15	32	19	20	0	56	33	50	12
SEX*																								
Male	83	85	82	92	78	78	62	100	96	94	97	94	83	94	90	88	72	68	73	0	79	33	20	38
Female	17	15	18	8	22	22	38	0	4	6	3	6	17	6	10	12	28	32	26	100	21	68	80	62
MARITAL STATUS																								
Married	77	72	73	71	80	76	81	78	81	83	82	73	75	66	76	67	73	63	59	100	77	58	80	50
Not married	21	26	25	27	19	22	19	22	18	17	18	26	21	31	19	27	24	38	36	0	20	33	20	50

*Actual values differ significantly from expected values at .05 level on chi-square test.

APPENDIX TABLE III-6

Amount of Alumni Employment by Graduation Year

(percent at each level)

			Divison		
1962 and earlier	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Quarter time	33	33	18	26	7
Half to 3/4 time	24	36	36	24	17
Full time	43	31	46	50	76
N.	21	75	50	34	29
1963-67					
Quarter time	37	31	23	22	17
Half to 3/4 time	26	47	32	29	28
Full time	37	22	45	49	55
N.	35	100	60	68	42
1968 and since					
Quarter time	43	36	31	34	22
Half to 3/4 time	26	38	30	27	24
Full time	31	26	39	39	54
N.	61	125	129	120	115

APPENDIX TABLE III-7

Personal Support of Candidates by Marital Status*

(percent using each source)

	Division				
Personal earnings	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Married	31	25	50	43	76
Not married	25	24	54	46	73
Spouse earnings					
Married	17	23	25	33	19
Not married	0	0	0	0	0
Fellowship					
Married	38	33	18	13	5
Not married	53	45	30	26	18
Teach. Flshp.					
Married	14	17	5	8	0
Not married	22	24	8	22	0
Loans & parents					
Married	0	2	1	2	0
Not married	0	6	8	6	9

*"Other" omitted because there are only 20 cases.

APPENDIX TABLE III-8

Personal Support of Candidates by Age

(percent in each age group)

	Age Group					
	25 and under	26-27	28-30	31-32	33-35	36 and older
Life Science						
Personal earn.	0	19	17	50	54	86
Spouse earn.	0	15	14	0	8	14
Fellowship	64	42	49	38	38	0
Teach. flshp.	36	23	14	12	0	0
Loans & parents	0	0	6	0	0	0
N.	11	26	35	8	13	7
Physical Science						
Personal earn.	10	23	23	32	22	50
Spouse earn.	0	20	15	16	22	38
Fellowship	80	40	32	32	33	0
Teach. flshp.	10	13	30	5	22	12
Loans & parents	0	3	0	16	0	0
N.	10	30	47	19	9	8
Social Science						
Personal earn.	19	23	51	74	65	76
Spouse earn.	12	23	21	12	25	3
Fellowship	63	41	18	9	5	10
Teach. flshp.	0	10	8	3	0	7
Loans & parents	6	3	2	3	5	3
N.	16	39	78	34	20	29
Humanities						
Personal earn.	0	26	34	48	57	54
Spouse earn.	0	11	17	22	33	24
Fellowship	67	21	28	19	5	12
Teach. flshp.	33	32	14	7	5	5
Loans & parents	0	10	7	4	0	5
N.	3	19	29	27	21	41
Education						
Personal earn.	0	0	58	71	67	89
Spouse earn.	0	50	42	14	33	2
Fellowship	0	50	0	14	0	9
Teach. flshp.	0	0	0	0	0	0
Loans & parents	0	0	0	0	0	0
N.	0	2	12	7	12	44

APPENDIX TABLE III-9

Age, Sex and Marital Status of Candidates Receiving Financial Aid

(percent)

	Total			Life Sci.			Phys. Sci.			Soc. Sci.			Humanities			Education*		
Age	%All	Fell	TF	%All	Fell	TF	%All	Fell	TF	%All	Fell	TF	%All	Fell	TF	%All	Fell	TF
25 & under	6	16	9	12	16	25	9	18	4	7	21	0	2	8	6	0	0	0
26-27	19	27	29	31	26	38	24	27	17	19	34	31	17	16	38	2	17	0
28-30	29	33	43	29	39	31	36	34	61	36	30	46	17	32	25	15	0	0
31-32	15	11	7	10	7	6	17	14	4	15	6	8	19	20	13	11	17	0
33-35	11	6	4	12	12	0	7	7	9	10	2	0	16	4	6	13	0	0
36 & over	20	7	7	7	0	0	7	0	4	14	6	15	28	20	12	59	67	0
Sex																		
Male	73	72	73	83	77	75	93	93	88	70	56	92	58	64	61	67	33	0
Female	27	28	27	17	23	25	7	7	12	30	44	8	42	36	39	33	67	0
Marital Status																		
Married	70	58	55	66	57	56	75	69	67	68	56	54	65	48	39	81	50	0
Not married	27	39	41	30	39	44	24	29	29	29	42	39	32	48	57	15	33	0

*N=6

APPENDIX TABLE III-10

Alumni Difficulty in Finding Employment by Division and Graduation Year

(percent at each level)

	Division				
No Difficulty	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
All	57	58	52	48	63
1962 or earlier	88	76	57	66	74
1963-67	61	74	61	63	72
1968 and since	43	36	46	34	56
Great Difficulty					
All	6	6	1	9	4
1962 or earlier	0	0	0	2	0
1963-67	1	0	2	3	2
1968 and since	9	13	2	15	6

APPENDIX TABLE III-11

Current Underemployment of Alumni by Sex and Division*

(percent at each level)

Under-Employment Level	Division									
	Life Sci.		Phys. Sci.		Soc. Sci.		Human.		Educ.	
	M	F	M	F	M	F	M	F	M	F
No	74	55	71	64	68	65	65	49	63	49
Somewhat	16	9	19	14	21	18	20	19	17	19
Yes	8	30	9	14	10	12	11	21	16	17
Grossly	2	6	1	7	1	5	3	9	4	15
N.	129	33	321	14	215	40	167	67	153	41

*Actual values differ significantly from expected values at .01 level on chi-square test by sex but not division.

APPENDIX TABLE VI-1

Optimal Number of Dissertation Committee Members*

(percent choosing each number)

	Division				
Faculty	Life Sci.	Phys. Sci.	Soc. Sci.	Human.**	Educ.
One or two	0	0	2	5	0
Three	11	19	36	31	4
Four	59	54	54	53	76
Five or six	30	27	8	12	20
Alumni					
One or two	0	4	3	3	2
Three	26	29	44	47	32
Four	53	47	46	39	49
Five or six	21	20	7	11	17
Candidates					
One or two	3	4	6	2	4
Three	23	34	58	47	48
Four	59	50	35	43	41
Five or six	15	12	1	8	7

*Actual values differ significantly from expected values at .01 level on chi-square test.

**Significant at .05 level.

APPENDIX TABLE VI-2

Pattern of Interaction between Student and Committee, As It Is And As It Should Be, by Division*

Occasion of Contact	Division Life Science			Physical Science			Social Science			Humanities			Education		
	F	A	C	F	A	C	F	A	C	F	A	C	F	A	C
AS IT IS															
Dss completion only	0	10	4	7	21	12	5	20	15	10	21	17	2	6	0
Prospectus & oral only	8	25	15	11	25	20	10	22	19	12	21	18	23	29	28
Sig junctures	45	15	20	26	11	19	26	12	19	30	14	16	28	20	24
Once or twice	45	50	58	49	43	45	59	46	45	48	44	49	47	45	47
Once a term or year	2	0	3	8	0	4	0	0	2	0	0	0	0	0	1
AS IT OUGHT TO BE															
Dss completion only	1	1	1	1	5	3	1	6	3	1	6	4	0	2	1
Prospectus & oral only	0	6	1	1	6	4	4	8	6	3	7	5	2	13	10
Sig junctures	56	44	49	42	29	30	53	37	40	50	39	37	51	43	40
Once or twice	29	36	40	39	45	45	37	46	42	40	39	44	42	41	43
Once a term or year	14	13	10	18	15	18	6	3	9	6	8	9	5	1	6

*Actual values differ significantly from expected values at .01 level on chi-square test.

APPENDIX TABLE VI-3

Desired Interaction Pattern by Respondent's Experience

(numbers)

Pattern of interaction preferred	Total	Pattern of Interaction Experienced				
		Dss compl only	Pros & oral only	Sig junct	Once or twice	Once/ term or year
Faculty						
Dss completion only	5	3	1	0	1	0
Prosp. & oral only	12	2	10	0	0	0
At sig. junctures	313	15	32	166	99	1
Once or twice	259	11	18	21	208	1
Once/term or year	32	0	5	7	12	8
Total	621	31	66	194	320	10
Candidates						
Dss completion only	19	17	0	0	2	0
Prosp & oral only	38	2	36	0	0	0
At sig junctures	270	29	53	110	73	5
Once or twice	354	29	41	19	261	4
Once/term or year	26	5	7	3	7	4
Total	707	102	137	132	343	13
Alumni						
Dss completion only	54	53	0	0	1	0
Prosp & oral only	99	9	89	0	1	0
At sig junctures	446	74	111	150	109	2
Once or twice	564	56	78	10	419	1
Once/term or year	43	14	12	5	12	0
Total	1206	206	290	165	542	3

APPENDIX TABLE VI-4

Role of Cognate Member, As It Is and As It Ought to Be*

(percent reporting each role)

Cognate Role	F	A	C	F	A	C	F	A	C	F	A	C	F	A	C
							As It Is								
Minor in all respects	20	43	28	42	59	43	29	47	34	34	51	30	11	28	25
Major in supervision, minor in evaluation	2	1	2	2	1	1	3	2	4	0	3	2	0	2	1
Minor in supervision, major in evaluation	29	27	20	16	15	19	14	20	12	14	17	15	42	26	29
Moderate in both	32	20	22	17	13	14	28	15	16	33	17	16	38	26	13
Major in both	5	7	7	2	4	4	5	7	8	3	6	9	7	14	9
Other	11	2	20	21	8	18	21	8	26	15	6	28	2	4	22
							As It Ought To Be								
Minor in all respects	4	18	8	18	34	23	9	26	23	13	31	20	7		
Major in supervision, minor in evaluation	2	2	4	2	4	2	5	5	9	2	5	3	2	4	5
Minor in supervision, major in evaluation	26	17	22	25	14	13	18	17	11	8	8	14	26	19	20
Moderate in both	54	50	54	44	39	50	52	45	39	57	46	48	40	41	38
Major in both	15	13	12	7	9	12	15	13	12	18	10	14	26	18	19
Other	0	0	0	4	0	0	1	0	0	2	0	0	0	0	0

*Actual values differ significantly from expected vaules at .01 level (.05 for candidates) on chi-square test.

APPENDIX TABLE VI-5

Preferred Role of Cognate Member by Role Experienced

(numbers)

Role preferred	Role Actually Played Minor all	Maj/suprvsn, min/eval	Min/suprvsn, maj/eval	Mod in both	Maj in both
Faculty					
Minor in all	45	0	1	0	0
Maj/supervsn,min/eval	4	6	3	3	0
Min/supervsn,maj/eval	37	0	67	10	0
Moderate in both	95	1	38	130	3
Major in both	13	4	17	24	22
Total	194	11	126	167	25
Alumni					
Minor in all	276	0	15	2	0
Maj/supervsn,min/eval	15	16	5	6	0
Min/supervsn,maj/eval	30	0	120	6	2
Moderate in both	191	5	82	182	6
Major in both	27	1	14	14	76
Total	539	22	236	210	84
Candidates					
Minor in all	86	0	6	2	0
Maj/supervsn, min/eval	9	11	5	3	1
Min/supervsn, maj/eval	24	1	57	6	0
Moderate in both	112	3	42	96	4
Major in both	7	1	17	12	48
Total	238	16	127	119	53

APPENDIX TABLE VI-6

Alumni Evaluation of Faculty-Student Interactive Situations*

(percent with each rating)

Value	Interactive Situations				
Life Science	Colloquia, invited spkrs	Regular seminars	Res team/ grp mtgs	Colloq/stu papers	Casual conversn
No value	4	2	10	6	0
Some value	37	24	19	39	12
Significant value	32	36	40	34	23
Great value	27	38	31	21	65
Physical Science					
No value	10	7	20	16	3
Some value	41	32	24	41	14
Significant value	30	40	34	29	41
Great value	19	20	22	14	42
Social Science					
No value	13	8	21	21	2
Some value	45	21	23	36	14
Significant value	26	40	32	28	29
Great value	16	31	24	15	55
Humanities					
No value	15	10	40	24	3
Some value	41	23	29	38	20
Significant value	27	37	22	23	29
Great value	17	31	9	15	48
Education					
No value	10	4	10	11	2
Some value	27	21	30	38	13
Significant value	35	41	37	37	33
Great value	28	34	23	14	52

*Actual values differ sginficantly from expected values at .01 level on chi-square test.

APPENDIX TABLE VI-7

Frequency of Faculty-Student Interactive Situations for Alumni*

(percent at each level)

Frequency	Interactive Situations Colloquia, invited spkrs	Regular seminars	Res team/ grp mtgs	Colloq/stu papers	Casual conversn
Life Science					
Never	5	2	33	14	2
Occasionally	56	18	40	48	27
Often	24	40	14	28	27
Very often	15	40	13	10	44
Physical Science					
Never	7	9	42	26	3
Occasionally	45	35	36	54	34
Often	31	39	15	17	37
Very often	17	17	7	3	26
Social Science					
Never	11	13	45	36	2
Occasionally	56	43	32	48	42
Often	23	29	14	13	33
Very often	10	15	9	3	23
Humanities					
Never	26	25	72	42	2
Occasionally	58	41	23	41	42
Often	14	22	5	11	33
Very often	2	12	0	5	23
Education					
Never	19	15	46	41	4
Occasionally	54	48	37	43	31
Often	21	26	13	13	34
Very often	6	11	4	3	31

*Actual values differ signfiicatnly from expected values at .01 level on chi-square test.

APPENDIX TABLE VI-8

Candidates' Evaluation of Faculty-Student Interactive Situations*

(percent with each rating)

Value	Interactive Situations				
	Colloquia, invited spkrs*	Regular seminars*	Res team/ grp mtgs*	Colloq/stu papers**	Casual conversn**
Life Science					
No value	6	2	9	9	2
Some value	42	46	15	37	9
Significant value	35	34	42	39	40
Great value	16	18	34	15	49
Physical Science					
No value	8	9	10	12	0
Some value	52	40	24	50	21
Significant value	32	32	38	26	40
Great value	8	18	28	12	39
Social Science					
No value	16	11	20	15	4
Some value	54	25	28	43	16
Significant value	21	42	28	30	32
Great value	9	22	23	11	48
Humanities					
No value	8	9	33	18	3
Some value	46	31	30	47	17
Significant value	28	34	24	25	38
Great value	18	26	13	10	41
Education					
No value	12	10	19	20	2
Some value	42	25	28	35	7
Significant value	29	41	27	39	40
Great value	17	23	26	6	51

*Actual values differ signficantly from expected values at .01 level on chi-square test.

**Significant at .05 level.

APPENDIX TABLE VI-9

Frequency of Faculty-Student Interactive Situations for Candidates*

(percent at each level)

Frequency	Interactive Situation				
	Colloq, invited spkrs	Regular seminars	Res team/ grp mtgs	Colloq/stu papers	Casual conversn**
Life Sciences					
Never	9	6	33	20	3
Occasionally	57	27	35	42	32
Often	26	45	19	31	40
Very often	8	22	13	7	25
Physical Sciences					
Never	14	16	40	34	4
Occasionally	50	43	37	53	47
Often	26	25	17	11	32
Very often	10	17	6	2	17
Social Sciences					
Never	15	20	54	34	6
Occasionally	68	44	27	47	40
Often	13	29	11	15	33
Very often	4	7	7	4	21
Humanities					
Never	17	29	72	44	7
Occasionally	61	38	23	42	37
Often	19	28	3	11	37
Very often	2	5	1	3	19
Education					
Never	16	24	46	49	3
Occasionally	61	52	33	39	28
Often	20	18	17	8	37
Very often	3	6	4	4	32

*Actual values differ significantly from expected values at .01 level on chi-square test.

**Not significant

APPENDIX TABLE VII-1

Time Status of Alumni While in Doctoral Program

(percent at each elapsed time level)

No. elapsed Years	Number of Full Time Equivalent Years in Program						
	1-3	4	5	6	7	8	9 or more
Life Science							
1-3	55	1	0	0	0		
4	20	69	0	0	0		
5	14	14	82	0	0		
6	5	8	9	57	0		
7	4	4	9	14	50		
8	0	3	0	14	50		
9 or more	2	1	0	14	0		
N.	56	74	22	14	2		
Physical Science							
1-3	59	1	0	0	0	0	0
4	27	54	4	4	0	25	0
5	10	18	61	0	0	0	0
6	3	17	14	67	0	0	0
7	0	6	9	13	58	25	0
8	0	2	7	12	25	0	0
9 or more	2	2	5	4	17	50	100
N.	124	126	56	24	12	4	1
Social Science							
1-3	32	1	0	0	0	0	0
4	24	36	3	0	0	0	0
5	28	31	43	0	0	0	0
6	5	15	27	45	0	0	0
7	7	11	8	35	50	0	0
8	1	3	8	15	0	100	0
9 or more	1	2	9	5	50	0	100
N.	74	91	60	20	8	1	1
Humanities							
1-3	46	1	4	0	0	0	0
4	26	22	4	4	0	0	50
5	11	24	30	0	0	0	0
6	7	21	15	22	0	17	0
7	6	8	22	13	50	0	0
8	2	12	7	17	0	33	0
9 or more	2	12	18	44	50	49	50
N.	93	87	27	23	4	6	2
Education							
1-3	48	4	0	0	0	0	
4	14	20	0	0	0	0	
5	14	13	38	17	0	0	
6	8	13	25	17	50	0	
7	6	16	0	17	0	100	
8	2	0	25	17	0	0	
9 or more	7	33	12	34	50	0	
N.	138	45	8	6	2	1	

APPENDIX TABLE VII-2

Alumni Time Spent in Ph.D. Program by Amount of Time Spent in Employment While Writing Dissertation*

(percent at each time level)

Elapsed years	Time Spent in Employment			
	Quarter time	Half time	Three-quarter time	Full time
Life Science				
1-3	32	7	0	20
4	40	24	0	28
5	21	21	0	22
6	4	31	0	8
7	0	14	0	7
8 or more	2	3	0	15
N.	47	29	0	40
Physical Science**				
1-3	26	19	4	22
4	38	30	32	27
5	17	20	20	16
6	14	15	20	11
7	2	7	16	10
8 or more	4	9	8	14
N.	101	96	25	79
Social Science				
1-3	16	11	6	6
4	33	25	17	12
5	24	33	67	22
6	13	14	6	24
7	8.	6	6	17
8 or more	5	11	0	18
N.	63	55	18	99
Humanities				
1-3	25	27	17	8
4	28	22	22	9
5	20	19	17	16
6	8	15	22	14
7	5	7	22	12
8 or more	15	10	0	41
N.	65	41	18	96
Education				
1-3	61	30	40	23
4	12	33	7	11
5	15	17	13	15
6	12	0	13	13
7	0	7	8	11
8 or more	0	13	20	26
N.	33	30	15	107

*Actual values differ significantly from expected values at .01 level on chi-square test.

**Not significant.

APPENDIX TABLE VII-3

Amount of Working Time by Age Group of Alumni

(percent at each working level)

			Division		
Age Group	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Quarter time					
25 and under	83	50	55	29	25
26-27	50	45	37	43	25
28-30	41	36	16	28	59
31-32	47	30	33	31	24
33-35	27	8	14	27	4
36 and over	17	13	24	25	10
Half & 3/4 time					
25 and under	17	32	18	57	50
26-27	23	34	44	33	38
28-30	35	43	37	39	11
31-32	12	41	23	31	35
33-35	27	54	14	21	28
36 and over	29	40	26	14	22
Full time					
25 and under	0	18	27	14	25
26-27	27	21	19	23	37
28-30	24	21	47	33	30
31-32	41	29	43	38	41
33-35	47	38	71	52	68
36 and over	54	47	50	61	68

APPENDIX TABLE VII-4

Alumni Elapsed Time in Ph.D. Program by Starting Time for Dissertation Research*

(percent at each elapsed time level)

	Division				
Early course	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
1-3	20	33	36	23	46
4	37	39	14	41	9
5	20	14	14	24	18
6	10	8	14	6	9
7	6	2	7	0	9
8	4	2	7	6	0
9 or more	4	2	7	0	9
Percent of all	31	15	6	7	5
Middle course					
1-3	18	24	17	23	48
4	31	33	30	23	24
5	29	27	17	19	12
6	12	5	22	12	12
7	6	4	4	12	4
8	4	4	4	12	0
9 or more	0	4	4	0	0
Percent of all	29	24	9	11	13
Later course					
1-3	15	17	11	20	35
4	49	27	20	24	15
5	17	16	28	11	11
6	12	22	16	12	12
7	5	9	17	14	8
8	2	4	2	5	4
9 or more	0	4	6	14	15
Percent of all	24	33	25	33	40
After course					
1-3	26	12	4	19	33
4	30	30	22	14	13
5	13	26	30	20	22
6	13	14	19	13	9
7	9	12	11	9	11
8	4	2	8	9	2
9 or more	4	4	6	16	9
Percent of all	14	19	35	26	23

			Division		
After candidacy	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
1-3	25	26	6	12	16
4	25	29	18	9	8
5	25	12	39	12	13
6	0	15	14	19	10
7	0	6	12	9	13
8	0	6	3	12	3
9 or more	25	6	8	26	37
Percent of all	2	10	25	23	19

*Actual values differ significantly from expected values at .01 level on chi-square test.

APPENDIX TABLE VII-5

Regression Equation for Number of Elapsed Years in Ph.D. Program By Division

		Division				
		Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
	Constant Term	3.14	3.43	3.49	3.70	2.86
Age	Under 25	-1.09	-1.06	- .91	-1.22	- .75
	26-27	- .60	- .60	- .68	- .96	- .65
	28-30	- .01	- .10	- .02	- .53	- .38
	31-32	.22	.25	- .12	.56	- .71
	33-35	- .15	.38	.39	1.00	.91
	36 & Over	1.63	1.13	1.34	1.15	1.58
	Have M.A.	- .39**	- .44	- .26**	- .48**	- .30*
	No. M.A.	.39**	.44	.26**	.48**	.30*
Stage Began	Early course	- .19*	- .53	- .35*	-1.34	- .42
	Mid course	- .42*	- .26	- .38*	- .39	-1.11
	Late course	0.00	.26	.26*	.26	.11
	After course	- .56*	.24	.37*	.49	- .06
	After candidacy	1.17*	.29	.10*	.98	1.48
Amount Work	Quarter time	- .43**	- .46*	- .32	- .32	- .54*
	Half time	.46**	- .08*	.11	- .61	- .18*
	Three-quater time	0.00	.52*	- .17	.08	.33*
	Full time	- .03**	.02*	.38	.85	.39*
FTE on Diss.	.5 Years	.20	- .15	-1.23	- .66	- .82*
	1.0 Years	-1.17	- .66	- .67	-1.15	- .58*
	1.5 Years	- .51	- .86	- .57	- .58	- .41*
	2.0 Years	- .54	- .28	- .08	.12	.66*
	2.5 Years	.30	.18	.20	- .82	.49*
	3.0 Years	.45	.29	.40	.58	- .27*
	3.5 or More	1.27	1.48	1.95	2.51	.93*
	R	.68	.61	.63	.74	.63
	R^2	.46	.38	.40	.54	.40
	S.E.	1.36	1.43	1.42	1.71	2.04

* Not significant
**Significant at .05 level

APPENDIX TABLE VII-6

Candidates' Elapsed Time in Ph.D. Program by Fraction of Dissertation Work Completed

(percent at each time level)

	Fraction of Dissertation Work Completed							
Life Science	Beg.	One quart.	Half	Three quart.	Near done	Final rev.	Finished completely	Can't say
1-3	33	40	29	34	17	11	21	50
4	17	47	36	34	48	44	50	17
5	0	13	21	0	26	22	8	17
6	17	0	7	8	4	0	8	17
7	0	0	7	8	4	11	4	0
8	17	0	0	8	0	11	0	0
9 or more	17	0	0	8	0	0	8	0
N.	6	15	14	12	23	9	24	6
Physical Science								
1-3	40	56	29	28	21	0	18	25
4	20	22	0	36	27	67	36	13
5	0	0	14	16	15	0	23	12
6	30	22	29	16	9	33	9	25
7	10	0	14	4	18	0	7	13
8	0	0	14	0	6	0	2	0
9 or more	0	0	0	0	3	0	5	12
N.	10	9	7	25	33	6	44	8
Social Science								
1-3	20	12	10	13	0	0	5	0
4	20	33	37	18	15	31	24	38
5	20	15	17	18	31	8	24	13
6	15	9	17	23	15	8	12	12
7	25	18	10	20	26	15	15	12
8	0	3	7	5	3	15	12	0
9 or more	0	9	2	3	10	23	7	25
N.	20	33	41	39	39	13	41	8
Humanities								
1-3	25	27	22	14	17	12	24	0
4	17	27	18	10	12	0	15	50
5	17	15	22	19	13	0	6	33
6	8	19	19	19	25	13	15	0
7	8	8	15	14	4	25	18	0
8	17	4	0	5	8	38	12	0
9 or more	8	0	4	19	21	12	9	16
N.	12	26	27	21	24	8	33	6
Education								
1-3	40	36	38	47	8	20	36	50
4	40	9	50	13	8	20	23	0
5	20	18	0	7	8	0	9	0
6	0	0	0	20	17	40	14	0
7	0	27	12	0	8	0	9	0
8	0	0	0	7	17	20	5	50
9 or more	0	9	0	7	33	0	4	0
N.	10	11	8	15	12	5	22	2

APPENDIX TABLE VII-7

Time Status of Candidates

(percent at each elapsed time level)

No. elapsed Years	Number of Full Time Equivalent Years in Program						
Life Science	1-3	4	5	6	7	8	9 or more
1-3	65	0	0	0	0		
4	15	74	8	33	0		
5	11	14	42	0	0		
6	2	6	17	33	0		
7	2	4	17	0	0		
8	4	2	0	0	0		
9 or more	0	0	16	33	100		
N.	46	51	12	3	1		
Physical Science							
1-3	59	2	0	0	0		
4	20	62	4	0	0		
5	8	13	41	7	0		
6	7	16	27	43	0		
7	5	4	14	21	100		
8	0	0	9	14	0		
9 or more	0	2	5	14	0		
N.	59	45	22	14	2		
Social Science							
1-3	28	1	2	0	0	0	0
4	35	45	3	0	0	0	0
5	13	21	40	0	0	0	0
6	12	11	17	40	0	0	0
7	10	13	20	40	62	0	0
8	0	6	12	10	8	0	0
9 or more	2	4	7	10	31	0	100
N.	60	85	60	20	13	0	2
Humanities							
1-3	47	7	3	0	20	25	0
4	23	28	0	0	0	0	0
5	6	23	26	0	0	0	0
6	8	23	23	22	0	0	0
7	6	19	23	11	0	0	0
8	9	0	8	33	40	25	0
9 or more	2	0	18	33	40	50	100
N.	53	43	39	9	5	4	1
Education							
1-3	42	0	17	0	100	0	0
4	26	15	0	0	0	0	0
5	11	8	0	0	0	0	0
6	10	38	0	0	0	0	0
7	5	23	17	0	0	0	0
8	2	15	33	0	0	0	100
9 or more	5	0	33	100	0	0	0
N.	62	13	6	2	1	0	1

APPENDIX TABLE VII-8

Candidate Elapsed Time in Ph.D. Program by Starting Time for Dissertation Research*

(percent at each time level)

	Division				
Early course**	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
1-3	21	50	21	40	29
4	53	27	21	10	29
5	5	9	21	20	0
6	5	9	21	20	29
7	5	5	14	10	0
8	0	0	0	0	14
9 or more	11	0	0	0	0
Percent of all	16	15	6	6	8
Middle course**					
1-3	29	19	21	62	11
4	50	50	29	19	33
5	12	12	29	6	11
6	8	13	7	0	22
7	0	3	14	0	0
8	0	3	0	13	0
9 or more	0	0	0	0	22
Percent of all	22	22	11	10	10
Later course					
1-3	37	23	4	17	32
4	37	23	37	17	32
5	16	16	20	19	9
6	3	16	17	17	14
7	5	12	10	15	5
8	3	2	1	8	9
9 or more	0	7	9	8	0
Percent of all	35	30	29	34	25
After course**					
1-3	15	19	3	12	35
4	35	28	12	18	9
5	27	19	16	10	13
6	8	16	22	21	9
7	8	19	28	16	9
8	4	0	6	10	9
9 or more	4	0	12	12	17
Percent of all	23	23	26	36	29
After candidacy**					
1-3	0	20	8	10	48
4	50	13	24	14	17
5	0	13	23	14	9
6	25	33	9	19	9
7	0	0	21	14	13
8	25	13	14	10	0
9 or more	0	7	2	19	4
Percent of all	3	10	28	13	28

*Actual values differ from expected values at .01 level on chi-square test.
**Not significant

APPENDIX TABLE VII-9

FTE Years on Dissertation by Proportion of Nearly Finished Candidates' Doctoral Program Devoted to It*

(percent at each time level)

	Percent of Doctoral Program				
Life Science	0-20	21-40	41-60	61-80	81-100
.5	0	0	5	0	0
1	0	22	19	0	0
1.5	100	44	9	0	0
2	0	0	29	17	0
2.5	0	11	24	35	20
3	0	11	9	26	20
3.5	0	11	0	13	40
4 or more	0	0	5	9	20
N.	1	9	21	23	5
Physical Science					
.5	0	0	3	0	0
1	100	21	3	0	12
1.5	0	21	19	0	25
2	0	14	13	28	25
2.5	0	14	28	16	25
3	0	7	22	28	13
3.5	0	7	9	12	0
4 or more	0	14	3	16	0
N.	1	14	32	25	8
Social Science					
.5	20	3	0	0	0
1	20	10	11	0	0
1.5	40	53	8	0	33
2	20	27	22	20	0
2.5	0	7	24	20	0
3	0	0	19	33	0
3.5	0	0	3	7	33
4 or more	0	0	13	20	33
N.	5	30	37	15	3
Humanities					
.5	0	5	0	7	0
1	18	21	5	7	0
1.5	46	37	21	0	0
2	9	21	32	7	0
2.5	9	0	0	7	100
3	18	16	21	43	0
3.5	0	0	10	0	0
4 or more	0	0	11	29	0
N.	11	19	19	14	1
Education					
.5	0	8	7	0	0
1	75	42	47	33	0
1.5	25	8	7	33	0
2	0	25	27	17	0
2.5	0	0	7	0	0
3	0	0	7	17	0
3.5	0	8	0	0	0
4 or more	0	8	0	0	100
N.	4	12	15	6	1

*Actual values differ significantly from expected values at .01 level on chi-square test.

APPENDIX TABLE VII-10

Optimal Time to Start Dissertation by Actual Starting Time, by Division, Total Sample
(percent at actual time)

Optimal Starting Time	Actual Starting Time: Early Course	Middle Course	Late Course	After Course	After Candidacy
Life Science					
Early course	70	13	5	11	0
Mid course	20	78	30	21	23
Late course	8	7	60	39	53
After course	2	2	5	27	6
After candidacy	0	1	0	1	18
N.	82	117	130	84	17
Physical Science					
Early course	66	13	7	2	7
Mid course	25	77	26	15	10
Late course	9	9	63	51	31
After course	0	1	4	30	28
After candidacy	0	0	0	2	24
N.	80	151	238	144	58
Social Science					
Early course	43	7	3	6	2
Mid course	32	74	23	16	13
Late course	21	12	69	39	38
After course	4	2	3	38	17
After candidacy	0	5	2	1	30
N.	28	57	178	211	149
Humanities					
Early course	79	4	5	3	6
Mid course	14	80	22	14	9
Late course	7	13	66	42	36
After course	0	2	6	39	17
After candidacy	0	0	1	2	32
N.	28	46	161	168	92
Education					
Early course	78	15	4	10	3
Mid course	17	67	25	15	15
Late course	6	18	66	45	43
After course	0	0	4	30	12
After candidacy	0	0	1	0	27
N.	18	39	111	84	67

APPENDIX TABLE VII-11

Alumni Judgement of Optimal Period for Dissertation According to Experience

(percent in each category)

	FTE Years Used						
Optimal FTE Yrs.	One half	One	One & one half	Two	Two & one half	Three	More than three*
Life Science							
One half	0	0	0	0	0	0	
One	0	24	10	0	0	4	
One & one half	7	29	20	10	7	0	
Two	14	24	30	28	36	19	
Two & one half	14	10	15	15	29	12	
Three	21	5	10	15	14	31	
Not relevant	21	10	15	18	11	4	
N.	14	21	20	39	28	26	19
Physical Science							
One half	0	2	2	0	0	0	
One	18	13	9	4	7	2	
One & one half	12	38	34	21	19	2	
Two	24	20	39	42	31	23	
Two & one half	12	9	5	14	21	27	
Three	12	0	2	5	17	23	
Not relevant	0	16	9	9	5	7	
N.	17	45	56	86	58	44	34
Social Science							
One half	22	5	0	0	0	0	
One	56	52	22	19	4	0	
One & one half	22	22	57	23	30	5	
Two	0	10	13	30	30	42	
Two & one half	0	0	0	5	13	21	
Three	0	3	0	5	9	5	
Not relevant	0	7	8	16	9	21	
N.	9	60	76	57	23	19	12
Humanities							
One half	20	0	0	0	0	0	
One	53	54	24	8	12	0	
One & one half	0	23	35	15	21	13	
Two	7	12	24	40	29	33	
Two & one half	0	3	0	6	0	0	
Three	0	0	4	8	8	13	
Not relevant	20	8	14	19	25	33	
N.	15	61	51	52	24	15	18
Education							
One half	19	2	0	6	0	9	
One	46	48	21	11	0	18	
One & one half	12	16	51	22	0	9	
Two	4	11	15	28	50	27	
Two & one half	0	1	4	6	25	0	
Three	4	1	0	6	0	18	
Not relevant	15	20	9	22	25	18	
N.	26	81	53	18	4	11	3

*See note to Appendix Table VII-12.

APPENDIX TABLE VII-12

Candidates' Judgement of Optimal Period for Dissertation According to Experience*

Optimal FTE Years	FTE Years Used: One half	One	One & one half	Two	Two & one half	Three	More than three*
Life Science							
One half	0	0	0	0	0	0	
One	14	29	19	12	0	0	
One & one half	14	21	14	4	0	0	
Two	0	21	10	28	26	33	
Two & one half	28	7	19	8	30	25	
Three	0	7	19	4	13	33	
Not applicable	43	14	19	24	13	8	
N.	7	14	21	25	23	12	11
Physical Science							
One half	0	0	0	0	0	0	
One	9	21	8	0	4	4	
One & one half	27	42	31	9	17	4	
Two	18	16	46	44	35	26	
Two & one half	9	5	4	17	22	26	
Three	0	10	0	13	4	17	
Not applicable	27	5	8	9	13	13	
N.	11	19	26	23	23	23	17
Social Science							
One half	13	2	4	0	0	0	
One	26	30	18	17	21	10	
One & one half	26	20	39	22	16	5	
Two	23	22	18	28	32	26	
Two & one half	3	4	4	9	5	0	
Three	3	4	4	4	10	32	
Not applicable	7	15	12	15	16	5	
N.	31	46	49	46	19	19	15
Humanities							
One half	6	0	0	4	0	0	
One	17	22	10	12	0	6	
One & one half	22	25	36	19	14	12	
Two	17	16	33	31	43	31	
Two & one half	11	3	8	4	0	13	
Three	6	9	5	8	14	19	
Not applicable	22	22	8	19	29	19	
N.	18	32	39	26	7	16	15
Education							
One half	6	3	0	0	0	0	
One	44	50	40	36	67	67	
One & one half	13	19	20	18	33	0	
Two	12	8	20	27	0	33	
Two & one half	0	3	0	0	0	0	
Three	0	3	10	0	0	0	
Not applicable	25	14	10	18	0	0	
N.	16	36	10	11	3	3	5

*Categories of answer for the two questions are not comparable at more than three years. The N's are shown to indicate the number of cases not cross-tabulated.

APPENDIX TABLE VII-13

Alumni Feelings of Too Much Time Spent on Dissertation by Age*

(percent with each attitude)

	Division				
	Life Sci.	Phys. Sci.	Soc. Sci.**	Human.	Educ.
No					
25 and under	100	85	54	100	50
26-27	74	60	66	85	50
28-30	56	40	45	53	71
31-32	20	45	39	50	83
33-35	50	50	42	53	56
36 and over	39	44	47	42	58
All	59	51	50	55	62
Perhaps					
25 and under	0	7	31	0	50
26-27	15	23	17	12	38
28-30	25	23	24	22	19
31-32	21	21	24	19	11
33-35	25	14	27	8	15
36 and over	19	28	24	20	16
All	20	21	23	17	18
Yes					
25 and under	0	7	15	0	0
26-27	10	13	17	3	0
28-30	19	35	31	24	10
31-32	29	34	36	31	6
33-35	25	36	30	39	30
36 and over	42	28	29	38	26
All	21	26	27	28	20
No Opinion					
25 and under	0	0	0	0	0
26-27	0	3	0	0	12
28-30	0	2	0	2	0
31-32	0	0	0	0	0
33-35	0	0	0	0	0
36 and over	0	0	0	0	0
All	0	2	0	0	0

* Actual values differ significantly from expected values at .01 level on chi-square test.

**Not significant

APPENDIX TABLE VII-14

Alumni Feelings of Too Much Time Spent on Dissertation by Source of Personal Support

(percent with each attitude)

			Division		
	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
No					
Pers. earn.	54	41	42	45	62
Spouse	44	43	50	68	75
Fell. or schl.	60	60	56	78	75
TF	62	46	43	50	70
RA	56	47	61	33	25
Loans	100	0	0	100	100
Parents	100	40	67	75	100
All	58	49	50	56	64
Perhaps					
Pers. earn.	11	28	22	16	14
Spouse	31	29	23	15	8
Fell. or schl.	19	21	26	16	17
TF	24	26	24	18	20
RA	22	16	15	67	38
Loans	0	0	0	0	0
Parents	0	20	33	0	0
All	20	22	23	17	15
Yes					
Pers. earn.	35	29	36	39	24
Spouse	25	29	27	15	17
Fell. or schl.	21	19	18	6	8
TF	14	28	33	32	10
RA	22	33	24	0	37
Loans	0	0	100	0	0
Parents	0	40	0	25	0
All	22	28	27	27	21
No Opinion					
Pers. earn.	0	2	0	0	0
Spouse	0	0	0	2	0
Fell. or schl.	0	0	0	0	0
TF	0	0	0	0	0
RA	0	3	0	0	0
Loans	0	0	0	0	0
Parents	0	0	0	0	0
All	0	1	0	0	0

APPENDIX TABLE VII-15

Candidate Feelings of Too Much Time by FTE Years Actually Spent on Dissertation

(percent at each time level)

	Division				
	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
No					
One half	7	9	15	17	16
One	20	13	24	20	56
One & one half	20	28	24	30	12
Two	20	15	20	20	12
Two & one half	22	13	6	2	0
Three	7	22	11	9	4
More than three	2	0	0	2	0
N.	54	46	66	46	25
Perhaps					
One half	4	12	9	22	20
One	9	15	27	37	60
One & one half	9	15	23	22	0
Two	35	23	25	0	10
Two & one half	9	18	12	11	0
Three	17	10	0	4	0
More than three	17	7	4	4	10
N.	23	40	56	27	20
Yes					
One half	3	2	12	5	18
One	6	12	16	15	26
One & one half	18	12	19	24	20
Two	18	12	20	22	15
Two & one half	26	19	10	4	8
Three	12	18	11	13	5
More than three	18	25	11	17	8
N.	4	57	114	76	39

APPENDIX TABLE VII-16

Candidate Feelings of Too Much Time Spent on the Dissertation by Age

(percent with each attitude)

			Division		
	Life Sci.**	Phys. Sci.**	Soc. Sci.*	Human.**	Educ.**
No					
25 and under	73	58	63	100	0
26-27	38	58	37	26	50
28-30	50	21	19	48	50
31-32	40	17	26	22	22
33-35	46	30	29	28	23
36 and over	22	22	18	22	26
All	46	33	27	30	29
Perhaps					
25 and under	7	25	12	0	0
26-27	37	24	37	21	50
28-30	22	29	28	13	8
31-32	0	33	15	7	22
33-35	15	20	8	16	23
36 and over	11	33	23	26	26
All	21	28	24	17	23
Yes					
25 and under	20	17	25	0	0
26-27	22	18	26	44	8
28-30	22	48	52	36	42
31-32	60	46	56	70	56
33-35	39	50	63	56	54
36 and over	56	44	56	50	46
All	30	38	48	50	47
No opinion					
25 and under	0	0	0	0	0
26-27	3	0	0	9	0
28-30	6	2	1	3	0
31-32	0	4	3	0	0
33-35	0	0	0	0	0
36 and over	11	0	3	2	2
All	4	1	1	3	1

*Actual values differ significantly from expected values at .01 level on chi-square test.

**Not significant

APPENDIX TABLE VII-17

Candidate Feelings of Too Much Time Spent on the Dissertation by Source of Personal Support*

(percent with each attitude)

	Division				
	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
No					
Pers earn	43	19	20	24	23
Spouse	46	23	19	20	23
Fell or schl	57	37	44	48	58
TF	44	37	21	33	17
Loans	0	0	33	0	0
Parents	0	100	100	67	0
All	48	30	26	29	28
Perhaps					
Pers earn	11	41	17	14	21
Spouse	9	23	27	23	17
Fell or schl	25	35	33	28	33
TF	31	17	29	11	0
Loans	0	0	50	0	0
Parents	100	0	0	0	0
All	21	30	24	17	22
Yes					
Pers earn	43	41	61	59	52
Spouse	27	50	54	57	25
Fell or schl	18	28	21	24	50
TF	25	42	50	50	0
Loans	100	100	17	100	0
Parents	0	0	0	33	10
All	28	39	49	52	48
No opinion					
Pers earn	4	0	2	3	3
Spouse	18	5	0	0	0
Fell or schl	0	0	2	0	0
TF	0	4	0	6	0
Loans	0	0	0	0	0
Parents	0	0	0	0	0
All	3	2	1	2	2

*Actual values differ significantly from expected values at .01 level on chi-square test.

APPENDIX TABLE VII-18

Rating of Factors Causing Delay in Completing the Ph.D.

Life Sciences

	Rating			
	Very Import. & Important		Not Important	
	Rank	Percent	Rank	Percent
Faculty				
Difficulties in reducing topic	1	57	12	8
Inadequate motivation	2	51	9	12
Personal problems	5	38	12	8
Lack of needed research skills	4	41	9	12
Selection of unexpectedly complex problem	8	26	6	22
Inadequate preparation for research	5	38	6	22
Lack of personal financial support	8	26	2	34
Difficulty in finding sufficiently import. topic	7	34	5	25
Insufficient guidance from chairman	3	46	11	11
Unrealistic perfectionism	8	26	6	22
Lack of research funds	12	20	1	43
Unduly long preparation for prelims	12	20	2	34
Inability to work with advisor	11	22	4	29
Alumni				
Lack of research skills	2	24	13	41
Difficulty in reducing topic	3	19	12	48
Selection of unexpectedly complex problem	1	25	11	53
Lack of personal financial support	7	14	5	74
Difficulty in finding sufficiently import. topic	4	17	8	64
Unrealistic perfectionism	6	15	10	55
Inadequate preparation for research	9	11	7	66
Insufficient guidance from chairman	4	17	9	61
Lack of research funds	10	10	2	79
Unduly long preparation for prelims	8	12	4	76
Personal problems	10	10	6	72
Inadequate motivation	12	5	3	77
Inability to work with chairman	12	5	1	85
Candidates				
Difficulties in reducing topic	1	31	12	34
Selection of unexpectedly complex problem	3	22	9	52
Lack of personal financial support	8	16	13	20
Unrealistic perfectionism	3	22	9	52
Lack of research funds	2	23	5	62
Lack of needed research skills	3	22	11	37
Personal problems	7	17	7	59
Insufficient guidance from chairman	6	21	8	56
Inadequate preparation for research	8	16	3	64
Difficulty in finding sufficiently import. topic	10	14	6	61
Unduly long preparation for prelims	13	5	2	73
Inadequate motivation	11	10	4	62
Inability to work with chairman	12	9	1	77

APPENDIX TABLE VII-18

Rating of Factors Causing Delay in Completing the Ph.D.

Physical Sciences

	Rating			
	Very Import. & Important		Not Important	
	Rank	Percent	Rank	Percent
Faculty				
Difficulties in reducing topic	5	43	8	15
Inadequate motivation	1	60	11	11
Personal problems	2	51	13	8
Lack of needed research skills	3	50	12	10
Selection of unexpectedly complex problem	4	45	10	14
Inadequate preparation for research	9	34	7	20
Lack of personal financial support	10	28	4	34
Difficulty in finding sufficiently import. topic	7	38	5	29
Insufficient guidance from chairman	6	40	8	15
Unrealistic perfectionism	8	36	5	29
Lack of research funds	13	18	1	51
Unduly long preparation for prelims	11	21	2	42
Inability to work with advisor	12	19	3	36
Alumni				
Lack of research skills	1	21	13	43
Difficulty in reducing topic	3	17	12	48
Selection of unexpectedly complex problem	9	9	7	67
Lack of personal financial support	6	13	5	73
Difficulty in finding sufficiently import. topic	2	18	11	58
Unrealistic perfectionism	9	9	7	67
Inadequate preparation for research	7	12	9	64
Insufficient guidance from chairman	4	14	10	59
Lack of research funds	8	10	2	78
Unduly long preparation for prelims	4	14	6	69
Personal problems	9	9	4	77
Inadequate motivation	12	8	2	78
Inability to work with chairman	13	4	1	86
Candidates				
Difficulties in reducing topic	1	28	13	32
Selection of unexpectedly complex problem	6	22	10	39
Lack of personal financial support	3	27	5	57
Unrealistic perfectionism	6	22	10	39
Lack of research funds	6	22	3	59
Lack of needed research skills	1	28	12	33
Personal problems	12	12	3	59
Insufficient guidance from chairman	4	25	9	48
Inadequate preparation for research	9	19	7	56
Difficulty in finding sufficiently import. topic	10	16	7	56
Unduly long preparation for prelims	5	23	2	60
Inadequate motivation	11	15	5	57
Inability to work with chairman	13	6	1	74

APPENDIX TABLE VII-18

Rating of Factors Causing Delay in Completing the Ph.D.

Social Sciences

	Rating			
	Very Import. & Important		Not Important	
	Rank	Percent	Rank	Percent
Faculty				
Difficulties in reducing topic	1	65	12	7
Inadequate motivation	5	43	8	24
Personal problems	3	45	12	7
Lack of needed research skills	5	43	9	16
Selection of unexpectedly complex problem	7	40	11	13
Inadequate preparation for research	3	45	9	16
Lack of personal financial support	2	46	7	25
Difficulty in finding sufficiently import. topic	9	34	4	28
Insufficient guidance from chairman	12	27	5	27
Unrealistic perfectionism	8	36	6	26
Lack of research funds	11	30	2	40
Unduly long preparation for prelims	10	31	3	31
Inability to work with advisor	13	6	1	49
Alumni				
Lack of research skills	4	19	9	57
Difficulty in reducing topic	1	26	13	41
Selection of unexpectedly complex problem	2	21	11	53
Lack of personal financial support	3	20	6	67
Difficulty in finding sufficiently import. topic	8	13	9	57
Unrealistic perfectionism	6	18	12	52
Inadequate preparation for research	4	19	8	61
Insufficient guidance from chairman	8	13	5	68
Lack of research funds	8	13	3	74
Unduly long preparation for prelims	11	10	4	70
Personal problems	7	14	7	66
Inadequate motivation	11	10	2	77
Inability to work with chairman	13	4	1	92
Candidates				
Difficulties in reducing topic	1	35	13	27
Selection of unexpectedly complex problem	2	33	12	31
Lack of personal financial support	2	33	8	55
Unrealistic perfectionism	4	28	11	37
Lack of research funds	6	24	4	59
Lack of needed research skills	5	26	10	44
Personal problems	10	19	9	54
Insufficient guidance from chairman	11	17	5	56
Inadequate preparation for research	7	22	5	56
Difficulty in finding sufficiently import. topic	11	17	2	61
Unduly long preparation for prelims	8	21	1	62
Inadequate motivation	9	20	3	60
Inability to work with chairman	11	17	5	56

APPENDIX TABLE VII-18

Rating of Factors Causing Delay in Completing the Ph.D.

Humanities

	Rating			
	Very Import. & Important		Not Important	
	Rank	Percent	Rank	Percent
Faculty				
Difficulties in reducing topic	4	42	9	15
Inadequate motivation	6	40	11	14
Personal problems	2	47	13	7
Lack of needed research skills	3	43	9	15
Selection of unexpectedly complex problem	7	35	7	20
Inadequate preparation for research	4	42	8	19
Lack of personal financial support	1	54	12	13
Difficulty in finding sufficiently import. topic	8	32	6	23
Insufficient guidance from chairman	10	25	4	30
Unrealistic perfectionism	8	32	4	30
Lack of research funds	11	21	2	44
Unduly long preparation for prelims	12	20	3	36
Inability to work with advisor	13	8	1	45
Alumni				
Lack of research skills	2	22	12	48
Difficulty in reducing topic	4	19	13	46
Selection of unexpectedly complex problem	6	15	7	61
Lack of personal financial support	1	24	10	54
Difficulty in finding sufficiently import. topic	8	14	5	63
Unrealistic perfectionism	3	20	11	53
Inadequate preparation for research	5	16	9	58
Insufficient guidance from chairman	8	14	4	67
Lack of research funds	11	10	3	72
Unduly long preparation for prelims	6	15	8	59
Personal problems	10	13	6	62
Inadequate motivation	12	9	2	75
Inability to work with chairman	13	7	1	81
Candidates				
Difficulties in reducing topic	3	36	13	32
Selection of unexpectedly complex problem	4	31	11	39
Lack of personal financial support	1	39	8	50
Unrealistic perfectionism	1	39	12	37
Lack of research funds	6	20	3	60
Lack of needed research skills	6	20	8	50
Personal problems	5	30	10	42
Insufficient guidance from chairman	12	16	5	57
Inadequate preparation for research	8	19	6	53
Difficulty in finding sufficiently import. topic	10	18	2	68
Unduly long preparation for prelims	11	17	4	59
Inadequate motivation	8	19	7	51
Inability to work with chairman	13	5	1	81

APPENDIX TABLE VII-18

Rating of Factors Causing Delay in Completing the Ph.D.

Education

	Rating			
	Very Import. & Important		Not Important	
	Rank	Percent	Rank	Percent
Faculty				
Difficulties in reducing topic	1	65	12	7
Inadequate motivation	7	38	7	16
Personal problems	4	50	9	9
Lack of needed research skills	4	50	9	9
Selection of unexpectedly complex problem	8	37	7	16
Inadequate preparation for research	2	55	12	7
Lack of personal financial support	6	49	5	22
Difficulty in finding sufficiently import. topic	3	51	9	9
Insufficient guidance from chairman	11	23	3	30
Unrealistic perfectionism	10	26	6	20
Lack of research funds	9	30	4	25
Unduly long preparation for prelims	13	2	2	44
Inability to work with advisor	12	14	1	52
Alumni				
Lack of research skills	2	25	13	40
Difficulty in reducing topic	3	23	12	43
Selection of unexpectedly complex problem	5	17	7	54
Lack of personal financial support	1	27	8	53
Difficulty in finding sufficiently import. topic	7	16	11	52
Unrealistic perfectionism	5	17	8	53
Inadequate preparation for research	7	16	8	53
Insufficient guidance from chairman	9	14	3	72
Lack of research funds	4	20	6	56
Unduly long preparation for prelims	11	11	5	68
Personal problems	10	12	4	71
Inadequate motivation	13	7	2	76
Inability to work with chairman	12	8	1	84
Candidates				
Difficulties in reducing topic	3	34	13	28
Selection of unexpectedly complex problem	11	19	9	47
Lack of personal financial support	1	41	7	49
Unrealistic perfectionism	6	26	10	43
Lack of research funds	2	38	6	51
Lack of needed research skills	8	20	12	40
Personal problems	5	27	8	48
Insufficient guidance from chairman	6	26	5	55
Inadequate preparation for research	8	20	3	57
Difficulty in finding sufficiently import. topic	4	32	11	42
Unduly long preparation for prelims	12	14	2	71
Inadequate motivation	8	20	3	57
Inability to work with chairman	13	6	1	81

APPENDIX TABLE VIII-1

Doctoral Study Places too Much Stress on Research to the Detriment of Other Professional Skills*

(percent in each division)

	Division				
Faculty	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Strongly agree	2	3	6	4	2
Agree	12	11	14	14	24
Disagree	47	47	45	48	53
Strongly disagree	33	29	32	25	13
No opinion	5	9	3	9	7
Alumni					
Strongly agree	5	4	3	4	5
Agree	16	22	17	15	9
Disagree	50	46	45	48	56
Strongly disagree	22	13	28	18	20
No opinion	8	15	7	15	9
Candidates					
Strongly agree	17	6	11	10	15
Agree	32	27	32	25	22
Disagree	29	39	35	33	44
Strongly disagree	12	9	11	14	15
No opinion	10	19	10	18	5

*Actual values differ significantly from expected values at .01 level on chi-square test.

APPENDIX TABLE VIII-2

Intellectual Scope of Doctoral Training is too Narrow*

(percent in each division)

	Division				
Faculty	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Strongly agree	6	6	8	5	7
Agree	25	23	25	21	20
Disagree	42	53	44	46	46
Strongly disagree	18	9	16	20	13
No opinion	9	9	7	8	15
Alumni					
Strongly agree	5	5	6	4	5
Agree	20	23	18	20	15
Disagree	52	48	43	47	54
Strongly disagree	16	12	28	21	19
No opinion	6	12	5	8	7
Candidates					
Strongly agree	14	7	12	11	2
Agree	25	24	30	27	21
Disagree	43	48	37	40	51
Strongly disagree	10	9	9	12	15
No opinion	8	12	12	10	11

*Actual values differ significantly from expected values at .01 level on chi-square test.

APPENDIX TABLE VIII-3

Student's Potential for Creative Thinking and Individual Expression Not Developed*

(percent with each opinion)

	Division				
	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Faculty					
Strongly agree	2	2	5	3	9
Agree	14	13	14	11	22
Disagree	52	49	38	50	35
Strongly disagree	17	20	17	25	17
No opinion	15	16	16	11	17
Alumni					
Strongly agree	1	3	5	7	4
Agree	7	12	15	18	14
Disagree	51	48	38	41	43
Strongly disagree	35	26	33	29	34
No opinion	7	12	9	6	6
Candidates					
Strongly agree	8	6	10	11	7
Agree	16	18	17	21	17
Disagree	50	50	36	38	46
Strongly disagree	15	9	17	19	21
No opinion	11	18	20	12	9

*Actual values differ significantly from expected values at .01 level on chi-square test.

APPENDIX TABLE VIII-4

Dissertation Research Directed to Advisor's Interest at Expense of Student Creativity*

(percent with each opinion)

	Division				
	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Faculty					
Strongly agree	2	3	1	1	2
Agree	14	18	8	6	9
Disagree	50	40	51	41	57
Strongly disagree	19	17	27	44	20
No opinion	14	22	14	9	13
Alumni					
Strongly agree	4	3	2	4	2
Agree	10	9	5	7	5
Disagree	36	47	36	38	28
Strongly disagree	44	30	53	46	61
No opinion	6	11	4	5	5
Candidates					
Strongly agree	9	4	4	3	7
Agree	15	20	7	8	3
Disagree	43	51	46	39	48
Strongly disagree	21	8	35	35	29
No opinion	12	16	8	15	13

*Actual values differ significantly from expected values at .01 level on chi-square test.

APPENDIX TABLE VII-5

Dissertation Research is too Specialized for Current Student Needs*

(percent with each opinion)

	Division				
Faculty	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Strongly agree	2	4	5	2	2
Agree	10	16	7	14	11
Disagree	54	53	52	48	63
Strongly disagree	24	18	23	20	11
No opinion	10	9	13	15	13
Alumni					
Strongly agree	1	3	3	1	2
Agree	9	18	7	9	8
Disagree	55	51	49	50	53
Strongly disagree	26	16	34	29	34
No opinion	9	12	7	11	3
Candidates					
Strongly agree	4	3	7	7	12
Agree	22	20	22	22	17
Disagree	48	57	41	41	37
Strongly disagree	12	8	13	12	13
No opinion	14	12	17	18	22

*Actual values differ significantly from expected values at .01 level on chi-square test.

APPENDIX TABLE VIII-6

Dissertation Research Should be More Relevant to Career Needs*

(percent with each opinion)

	Division				
	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Faculty					
Strongly agree	5	7	7	6	13
Agree	30	26	24	23	41
Disagree	35	41	37	40	24
Strongly disagree	14	10	12	16	2
No opinion	16	16	21	14	20
Alumni					
Strongly agree	13	12	10	12	12
Agree	19	27	21	31	29
Disagree	35	31	29	25	27
Strongly disagree	14	10	19	16	15
No opinion	19	20	22	16	17
Candidates					
Strongly agree	9	10	13	15	23
Agree	32	36	35	28	37
Disagree	26	28	22	25	26
Strongly disagree	9	6	7	8	6
No opinion	24	20	23	24	8

*Actual values differ significantly from expected values at .01 level on chi-square test for respondent groups, but not among divisions.

APPENDIX TABLE VIII-7

Dissertation Phase Should be Revised to take Account of Reduced Demand for Ph.D.s*

(percent with each opinion)

			Division		
Faculty	Life Sci.	Phys. Sci.	Soc. Sci.	Human.	Educ.
Strongly agree	5	9	6	5	2
Agree	14	16	16	19	9
Disagree	37	32	30	36	27
Strongly disagree	28	25	28	26	29
No opinion	16	18	20	16	33
Alumni					
Strongly agree	17	22	19	24	14
Agree	23	27	28	26	24
Disagree	18	19	16	13	22
Strongly disagree	20	11	17	20	21
No opinion	21	21	21	18	18
Candidates					
Strongly agree	20	17	21	24	19
Agree	30	32	35	29	19
Disagree	11	20	16	16	23
Strongly disagree	8	9	5	8	13
No opinion	31	22	23	23	22

*Actual values differ significantly from expected values at .01 level on chi-square test for respondent groups, but not among divisions.

APPENDIX TABLE VIII-8

Evaluation of Candidacy Regulations*

	Faculty	Alumni	Candidates
		Life Science	
Adequacy**			
1	20	14	18
2	47	55	55
3	12	11	6
4	21	20	21
Flexibility***			
1	15	13	18
2	56	53	36
3	1	2	4
4	28	32	42
		Physical Science	
Adequacy			
1	31	13	24
2	41	47	51
3	12	11	9
4	16	29	16
Flexibility			
1	25	11	21
2	51	46	40
3	3	1	2
4	21	42	37
		Social Science	
Adequacy			
1	30	12	23
2	31	37	45
3	9	16	9
4	30	35	23
Flexibility			
1	23	11	22
2	33	46	35
3	3	3	2
4	41	40	41
		Humanities	
Adequacy			
1	27	11	28
2	40	48	38
3	9	15	11
4	24	26	23
Flexibility			
1	25	12	21
2	50	49	38
3	3	1	3
4	23	38	37

	Faculty	Alumni	Candidates
Adequacy **		Education	
1	37	17	28
2	32	49	48
3	19	17	12
4	12	16	12
Flexibility***			
1	25	14	19
2	52	61	41
3	2	4	1
4	21	21	39

*Actual values differ significantly from expected values at .01 level on chi-square test.

**Not significant among respondent groups.

***Significant among respondent groups at .05 level.

APPENDIX TABLE VIII-9

Evaluation of Fee Structure*

(percent)

	Faculty	Candidates
	Life Science	
Adequacy**		
1	33	34
2	28	37
3	7	3
4	32	26
Flexibility***		
1	18	30
2	35	23
3	8	3
4	39	44
	Physical Science	
Adequacy**		
1	39	39
2	31	36
3	8	10
4	22	15
Flexibility**		
1	25	26
2	39	29
3	6	4
4	30	41
	Social Science	
Adequacy		
1	54	59
2	11	23
3	6	4
4	30	15
Flexibility**		
1	36	43
2	19	17
3	7	6
4	38	33
	Humanities	
Adequacy**		
1	49	56
2	19	22
3	5	5
4	27	18
Flexibility**		
1	36	35
2	28	21
3	9	5
4	27	39

	Faculty	Candidates
	Education	
Adequacy**		
1	41	61
2	34	22
3	10	8
4	15	8
Flexibility**		
1	24	38
2	36	21
3	9	16
4	31	26

*Actual values differ significantly from expected values at .01 level on chi-square test.

**Not significant among respondent groups.

***Significant at .05 level.

APPENDIX TABLE VIII-10

Number of Committees Currently Chairing by Rank *

(percent at each number)

			Division		
No. Committees	Life Sci.**	Phys. Sci.**	Soc. Sci.**	Human.	Educ.
Asst. Prof.					
None	54	34	48	68	50
One	20	31	39	8	0
Two	15	19	4	12	50
Three	3	3	0	8	0
Four	3	6	4	4	0
Five	3	6	4	0	0
More than five	3	0	0	0	0
N.	3	0	0	0	0
Assoc. Prof.					
None	34	29	31	24	46
One	11	17	16	9	36
Two	36	25	13	24	0
Three	9	19	20	27	0
Four	2	8	7	6	18
Five	5	2	11	6	0
More than five	2	0	2	3	0
N.	2	0	2	3	0
Full Prof.					
None	32	31	21	17	12
One	14	25	21	19	8
Two	19	19	16	19	12
Three	16	12	12	16	17
Four	10	4	10	10	8
Five	8	7	14	17	17
More than five	1	2	6	3	25
N.	1	2	6	3	25

*Actual values differ significantly from expected values at .05 level on chi-square test.

**Not significant

APPENDIX B

QUESTIONNAIRES

THE UNIVERSITY OF MICHIGAN
HORACE H. RACKHAM
SCHOOL OF GRADUATE STUDIES
ANN ARBOR, MICHIGAN 48104

OFFICE OF THE DEAN

April 3, 1974

Dear Colleague:

The last formal review of the dissertation requirement at The University of Michigan occurred in the 19th Century. This disquieting knowledge and widely publicized speculations regarding the future of graduate education led the Executive Board of the Graduate School to commission a faculty committee to review the role of the dissertation in doctoral study at The University. We are writing to ask your cooperation in that effort.

It is important that our recommendations reflect the experiences and considered judgements of all faculty members who are concerned with doctoral study. To obtain this information as efficiently as possible, we have prepared the enclosed questionnaire.

The questionnaire requires less than 20 minutes to fill out. We will be grateful for more complete responses if you have time, but as a minimum may we request that you fill out the standardized questions.

Please circle only one response number for each question. We have provided space for comments regarding certain issues, but we hope that you will discuss further any points that seem important. We have left the back of the last page blank for that purpose. Please return the questionnaire to your departmental secretary, who will forward it to us. May we request the completed questionnaire by April 19, 1974.

Thank you for your cooperation. We will make a full report of our findings to the faculty when our work is done.

Cordially,

Richard H Sands

Prof. Richard Sands
Chairman

The Committee:
Ms. Joan Edwards, Zoology
Dean Wade Ellis, Graduate School
Prof. Ilene Forsyth, History of Art
Prof. Joseph Payne, Education
Prof. L. T. Rutledge, Neurosciences
Ms. Mary Robischon, History
Prof. Richard Sands, Physics
Prof. Edward Walker, Psychology
Prof. Charles Witke, Classical Studies
Prof. Chia-Shun Yih, Engineering

QUESTIONNAIRE ON THE DISSERTATION PHASE OF THE PH.D.
.FACULTY

1-6. In what department is your main appointment? ______________________________

7. How many dissertation committees have you chaired in the past 10 years, including those you are currently chairing?
1) none 5) 21-40
2) 1-5 6) over 40
3) 6-10
4) 11-20

8. How many dissertations are you currently chairing?
1) none 5) four
2) one 6) 5-7
3) two 7) 8-10
4) three 8) over 10

9. On how many dissertation committees have you served, including current committees?
1) none 4) 11-20
2) 1-5 5) 21-40
3) 6-10 6) over 40

10. In the light of your own standards and experience, what proportion of the dissertations in your department fail to meet, or just barely meet, minimum standards:
1) none 2) Less than 5% 3) 5-10% 4) 11-20% 5) 21-30% 6) Over 30%

11-22. To what extent should the following objectives for the dissertation be emphasized?

1	2	3	4	5	6	7
No opinion	No emphasis	Increasing degrees of emphasis →				great emphasis

11. To make a substantive contribution to knowledge	1	2	3	4	5	6	7
12. To acquire broadly useful research skills	1	2	3	4	5	6	7
13. To develop and demonstrate the capability of making future contributions to knowledge	1	2	3	4	5	6	7
14. To develop and demonstrate high-level problem solving skills	1	2	3	4	5	6	7
15. To acquire a broad and general knowledge of a research area in your discipline	1	2	3	4	5	6	7
16. To learn the literature and skills relavant to a specific research problem	1	2	3	4	5	6	7
17. To learn to organize and communicate research	1	2	3	4	5	6	7
18. To generate publishable work	1	2	3	4	5	6	7
19. To develop the ability to identify important research problems	1	2	3	4	5	6	7
20. To relate research to activities such as teaching and course organization	1	2	3	4	5	6	7
21. To observe, as an apprentice, the research activities of a scholar by working along with him/her	1	2	3	4	5	6	7
22. To develop judgement and standards about the nature and quality of other people's research	1	2	3	4	5	6	7

23. In your department, how do students generally select their dissertation advisors?
1) Advisor invites student to study with him or her.
2) It is a joint decision between student and advisor.
3) A department committee makes the selection.
4) Origin of the selection is unclear.
5) Other:

24. What pattern of supervision do you generally exercise when chairing a dissertation committee?
1) Only at the final stages of the project.
2) At the initial and final stages of the project.
3) Throughout the process, but concentrated at the beginning and end.
4) Moderate supervision occurring evenly through the entire process.
5) Moderately heavy supervision throughout the process.
6) Very heavy supervision throughout the process.
7) Other (please specify)

25. Does your department recognize service on dissertation committees when determining faculty workloads?
1) No, not in any way
2) Yes, in informal ways
3) Yes, through an explicit, detailed formula

26. Is the extent of workload recognition provided in your department for dissertation supervision appropriate?
1) No, much more credit should be given
2) No, more credit should be given
3) Yes, adequate credit is given
4) No, less credit should be given
5) No, much less credit should be given

27. How are the members of dissertation committees in your department generally selected?
1) The advisor selects them
2) Students and advisor decide together
3) Department or program chairman assigns them
4) A department committee assigns them
5) Origin or decision unclear
6) Other:

28. What is the general pattern of interaction between students in your department and members of their committees? The Committee meets:
1) Only to pass on prospectus and at the oral examination.
2) Only when the dissertation is completed.
3) At significant junctures during research progress.
4) Once a year to check on the student's progress.
5) Once each term to check on student's progress.
6) Only once or twice, but the student interacts frequently with one or two members of the committee.

29. Which of the patterns of interaction outlined in question #28 do you think would be most beneficial to students educationally?
1) 2) 3) 4) 5) 6)

30. In your experience, how has the cognate member of the dissertation committee generally functioned?
    1) Generally deferred to the department members.
    2) Played a minor role in evaluating the dissertation and final oral.
    3) Played a major role in evaluating the dissertation, but a minor role in supervising the candidate's work.
    4) Played a major role in the supervision of the candidate's work, but a minor role in evaluating the final product.
    5) Played a moderate role in both supervision and evaluation.
    6) Played a major role in both the evaluation of and the supervision of the candidate's work.

31. Which of the role descriptions outlined in question #30 do you think would be most beneficial to students educationally?
    1) 2) 3) 4) 5) 6)

32. In your work with dissertation committees, how often have serious disagreements among faculty members occurred regarding the acceptability of the dissertation or of specific sections of the dissertation?
    1) Never
    2) Less than 5% of the cases
    3) 5%-10% of cases
    4) 15% of cases
    5) 25% of cases
    6) 30% or more of cases

32a. What generally is the nature of such conflicts and how are they resolved?

33. How many members, including the dissertation advisor, do you think should serve on each dissertation committee? State a minimum number.
    1) One
    2) Two
    3) Three
    4) Four
    5) Five
    6) Six or more

34. Do you think the number of doctoral students per faculty member should be regulated in any way?
    1) No
    2) Possibly, under certain conditions.
    3) Yes

34a. Comments:

35. When do students in your department generally begin to work on dissertation research or possible dissertation research?
    1) In the early stages or course work.
    2) In the middle stages of course work.
    3) In the later stages of course work.
    4) After course work, before candidacy
    5) After candidacy

36. When should students in your department begin to work on dissertation research? (Please use the same answers as for question #35)
    1) 2) 3) 4) 5)

37. In your opinion, how many full-time-equivalent years should a student spend on the dissertation in your field (e.g. from selection of the problem through research to completion of the written document)?

1) One-half year
2) One year
3) One and a half years
4) Two years
5) Two and a half years
6) Three years
7) Three to four years
8) More than four years
9) Number of years not relevant

38-49. In the cases when students take an exceptionally long time to complete the Ph.D. degree, please indicate the relative importance of the following as causative factors:

1) No opinion
2) Not important
3) Of some importance
4) Important
5) Very Important

38. Unduly long preparation for preliminary examinations 1 2 3 4 5
39. Inadequate preparation for research prior to candidacy 1 2 3 4 5
40. Lack of certain necessary research skills 1 2 3 4 5
41. Insufficient guidance provided by dissertation advisor 1 2 3 4 5
42. Lack of personal financial support 1 2 3 4 5
43. Lack of funds for research costs 1 2 3 4 5
44. Inability to work with dissertation advisor 1 2 3 4 5
45. Difficulties in finding a topic of sufficient importance 1 2 3 4 5
46. Difficulties in reducing ropic to manageable scope 1 2 3 4 5
47. Unrealistic perfectionism 1 2 3 4 5
48. Selection of unexpectedly complex research problem 1 2 3 4 5
49. Personal problems 1 2 3 4 5
50. Inadequate motivation 1 2 3 4 5

50a. Please comment further on any points which seem particularly important with regard to the time spent on dissertations:

51. Do you think it would be desirable to shorten the dissertation phase of the doctoral program in some way?

1) No opinion
2) No
3) Perhaps
4) Definately yes

Comments:

52. Should there be a maximum time limit for working on the Ph.D. Degree?
1) No
2) Yes, two to four years
3) Yes, five years
4) Yes, six years
5) Yes, seven years
6) Yes, eight years
7) Yes, nine years
8) Other (please specify)

53-60. Please indicate whether you agree, disagree, or have no opinion , with regard to the following statements as they pertain to your own department.

1) Strongly disagree
2) Disagree
3) No opinion
4) Agree
5) Strongly agree

53. Doctoral study places too much stress on research to the detriment of other professional skills 1 2 3 4 5

54. The intellectual scope of training in the doctoral program is too narrow. 1 2 3 4 5

55. Dissertation research is directed toward the advisor's interest at the expense of student creativity. 1 2 3 4 5

56. The student's potential for creative thinking and individual expression is not being developed in the current program. 1 2 3 4 5

57. Dissertation research is too specialized for current student needs. 1 2 3 4 5

58. Dissertation research should be more relevant to the career needs of students. 1 2 3 4 5

59. The dissertation phase should be revised to take into account the reduced demand for Ph.D.s in academic employment. 1 2 3 4 5

60. Greater involvement of non-academic professionals in the current doctoral program is desirable. 1 2 3 4 5

61-73. Please evaluate the following components of the dissertation phase of the doctoral program in your department according to the scale at the right.

1) No opinion
2) Needs substantial revision
3) Could be improved
4) Adequate
5) Good

61. Integration of research and course work 1 2 3 4 5

62. The procedures for selecting an advisor and committee 1 2 3 4 5

63. The evaluation process for admitting students to the doctoral program 1 2 3 4 5

64. The prospectus procedure, selection of a problem 1 2 3 4 5

1) No opinion 2) Needs substantial revision 3) Could be improved 4) Adequate 5) Good

65. Generally expected scope of research problems	1	2	3	4	5
66. Formal arrangements for student/faculty interaction	1	2	3	4	5
67. Informal arrangements for student/faculty meetings	1	2	3	4	5
68. Nature of the supervisory relationship between advisor, committee and candidate	1	2	3	4	5
69. Generally accepted set of standards regarding what a dissertation should represent.	1	2	3	4	5
70. Evaluation process for completed dissertations	1	2	3	4	5
71. Nature and timing of the oral examination	1	2	3	4	5
72. Format of the written document	1	2	3	4	5
73. The fostering of student creativity	1	2	3	4	5

73a. Please comment further on any points which seem particularly important with regard to changes in the dissertation phase.

74. Should graduate students and/or doctoral candidates be regularly consulted in the evaluation of departmental requirements for the degree?
1) No
2) In certain, but not all cases
3) Yes

75. How much total money does the average candidate in your department expend for the direct costs of research (over and above subsistance and tuition) such as travel, equipment, etc.?
1) 0-$100
2) $100-$500
3) $500-$1,000
4) $1,000-$2,000
5) $2,000-$3,000
6) Over $3,000

76. What is the chief source of funds that candidates use to pay for these costs?
1)Normal departmental budget
2) University research funds
3) Federal grants
4) Other grants
5) Personal
6) Other:

77. Current Graduate School policy states that no previously published material may be included in the bound dissertation that is presented in partial fulfillment of the degree requirements. What is your opinion regarding this policy?
1) Previously published materials should not be included.
2) Previously published work should be permitted with controls to ensure that the work was done as part of the student's doctoral training.
3) Published work should be permitted, unless the committee agrees that its inclusion in the dissertation would be inappropriate.

78. Do you think positive measures to increase the probability that dissertation research in your department reaches publication are needed?
 1) No opinion
 2) The current system in my department is adequate
 3) Yes, depending on what measures are proposed
 4) Yes, by all means

79. Would you favor more flexible format standards for the dissertation, such as two to four substantial journal articles in place of the current model?
 1) No opinion
 2) No
 3) Perhaps, if sufficiently substantial
 4) Yes
 5) Yes, and other changes might be envisioned as well.

80. Please estimate the percentage of dissertation research in your department that reaches publication:
 1) 0-20%
 2) 30-40%
 3) 40-60%
 4) 60-80%
 5) 80-100%

81-90. In the course of dissertation work, students and faculty come in contact with various regulations of the Graduate School. Please evaluate the following according to both right-hand and left-hand scales.
 1) No opinion
 2) Needs revision
 3) Adequate
 4) Good

Flexibility of Administration:
 1) No opinion
 2) Too much
 3) About right
 4) Too little

81.	1	2	3	4	The candidacy regulations	86.	1	2	3	4
82.	1	2	3	4	The current fee structure	87.	1	2	3	4
83.	1	2	3	4	Regulations regarding written format	88.	1	2	3	4
84.	1	2	3	4	Procedures in the Dissertation Secretary's Office	89.	1	2	3	4
85.	1	2	3	4	Scheduling of various stages in the Dissertation Secretary's Office	90.	1	2	3	4

81-90a. Please elaborate on the reverse side if you feel any of these areas need revision.

91. What is your current academic rank?
 1) Instructor
 2) Assistant Professor
 3) Associate Professor
 4) Professor
 5) Adjunct or visiting faculty
 6) Other

92. Please add any additional comments on the reverse side.

THE UNIVERSITY OF MICHIGAN
HORACE H. RACKHAM
SCHOOL OF GRADUATE STUDIES
ANN ARBOR, MICHIGAN 48104

OFFICE OF THE DEAN

April 19, 1974

Dear Doctoral Candidate:

The last formal review of the dissertation requirement at The University of Michigan occurred in 1893. This disquieting fact and widely publicized speculations regarding the future of graduate education led the Executive Board of the Graduate School to commission a faculty committee to review the role of the dissertation in doctoral study at The University. We are writing to ask your cooperation in that effort.

It is important that our recommendations reflect the experiences and considered judgments of students who are currently working on dissertations as well as of faculty members and alumni. To obtain this information as efficiently as possible, we have prepared the enclosed questionnaire, versions of which are being sent to the other two constituent groups.

The questionnaire requires about 30 minutes to complete. We will be grateful for more lengthy responses if you have time, but as a minimum may we request that you fill out the standardized questions.

Your responses are confidential. We are not asking for names: only statistical information will be supplied to your department. Individually identifiable statistics will be obscured before being passed on.

Please circle only one response number for each question. We have provided space for comments regarding certain issues, and we hope you will discuss further any points that seem important. The last page is left blank for that purpose.

Please return the questionnaire in the enclosed envelope by May 10. No postage is necessary if mailed in the United States.

Thank you for your cooperation. Your responses will provide invaluable information to your department and to The University as decisions are made regarding the dissertation phase of the doctoral degree.

Cordially,

Richard H Sands

Prof. Richard Sands, Chairman

The Committee:
Ms. Joan Edwards, Zoology
Dean Wade Ellis, Graduate School
Prof. Ilene Forsyth, History of Art
Prof. Joseph Payne, Education
Ms. Mary Robischon, History
Prof. Richard Sands, Physics
Prof. Edward Walker, Psychology
Prof. Charles Witke, Classical Studies
Prof. Chia-Schun Yih, Engineering

QUESTIONNAIRE ON THE DISSERTATION PHASE OF THE PH.D.
DOCTORAL CANDIDATES
April, 1974

1-6. In what department are you studying for your Ph.D.? ______________________________

7-16. How do you rate the following objectives with regard to their importance in motivating you to seek a Ph.D.?

7.	Life-long ambition	1	2	3	4	5
8.	Required for a better job	1	2	3	4	5
9.	Needed it for prestige	1	2	3	4	5
10.	Required for career objectives	1	2	3	4	5
11.	Scholarly interest in subject	1	2	3	4	5
12.	For general intellectual growth	1	2	3	4	5
13.	Greater job security	1	2	3	4	5
14.	Higher salaries available	1	2	3	4	5
15.	To be able to contribute to the general state of knowledge	1	2	3	4	5
16.	Other:	1	2	3	4	5

Scale:

1) No opinion
2) Not important
3) Somewhat important
4) Important
5) Highly important

17-28. To what extent should the following objectives for the dissertation be emphasized?

1	2	3	4	5	6	7
No opinion	No emphasis	→	→	→	→	great emphasis

17.	To make a substantive contribution to knowledge	1	2	3	4	5	6	7
18.	To acquire broadly useful research skills	1	2	3	4	5	6	7
19.	To develop and demonstrate the capability of making future contributions to knowledge	1	2	3	4	5	6	7
20.	To develop and demonstrate high-level problem solving skills	1	2	3	4	5	6	7
21.	To acquire a broad and general knowledge of a research area in your discipline	1	2	3	4	5	6	7
22.	To learn the literature and skills relevant to a specific research problem	1	2	3	4	5	6	7
23.	To learn to organize and communicate research	1	2	3	4	5	6	7
24.	To generate publishable work	1	2	3	4	5	6	7
25.	To develop the ability to identify important research problems	1	2	3	4	5	6	7
26.	To relate research to activities such as teaching and course organization	1	2	3	4	5	6	7
27.	To observe, as an apprentice, the research activities of a scholar by working along with him/her	1	2	3	4	5	6	7
28.	To develop judgment and standards about the nature and quality of other people's research	1	2	3	4	5	6	7

29. Have you any further observations about the objectives you hope to attain, or are attaining, while you work on your dissertation project?

29. How relevant to your subsequent career do you expect your dissertation research to be?
1) Don't know
2) Not at all relevant or helpful
3) Relevant in a general way
4) Directly relevant but not essential to specific work plans
5) Directly relevant and essential to career

30-31. Which one of the following categories best represents the employer type you see as your main career objective:
1) Ph.D. granting university
2) Four-year college or university (no or few doctoral programs)
3) Community or Jr. college
4) Elementary or secondary school
5) Federal government
6) State or local government
7) Non-profit organization
8) Industry or business
9) Self-employed
10) Unemployed
11) Other:

32-33. Please circle your anticipated primary work activity in the first column (32) and your anticipated secondary work activity in the column (33). Circle one in each column.

	32. Primary	33. Secondary
Basic Research	1)	1)
Development and applied research	2)	2)
Teaching	3)	3)
Administration	4)	4)
Professional services	5)	5)
Other	6)	6)

34. Do you plan to take a post-doctoral research position in the years immediately following the completion of your doctoral degree?
1) No
2) Yes, if I can get one
3) Definitely yes

35. Do you anticipate having serious difficulties locating a suitable position upon completion of your doctoral degree?
1) No
2) Possibly some
3) Yes, a lot
4) I do not plan to seek employment in the field of my academic specialty

36. If you had the option, under what conditions would you take a part-time position in your field?
1) Never
2) Only if nothing else available
3) Would like to work part-time 2-5 years
4) Would like permanent part-time position

37. What proportion of your graduate work in your current doctoral program will have been directly devoted to the research and writing of your dissertation when you graduate?
1) 0-20%
2) 21-40%
3) 41-60%
4) 61-80%
5) 81-100%

38. How did you select your dissertation chairman?
1) My chairman invited me to study with him or her
2) It was a joint decision between me and my chairman
3) A department committee made the selection
4) Origin of the selection is unclear
5) Other:

39. How did you decide on a dissertation topic?
1) My dissertation chairman assigned it.
2) My dissertation chairman proposed several topics and I selected one.
3) I proposed several topice and my chairman guided me towards a manageable topic.
4) My choice was determined by the availability of funds for research.
5) I do not have a topic yet.

40. What pattern of supervision has characterized your relationship with your dissertation chairman? Mark the most appropriate category.
1) Only at the final stages of the project.
2) At the initial and final stages of the project.
3) Throughout the process, but concentrated at the beginning and end.
4) Moderate supervision occurring evenly through the entire process.
5) Moderately heavy supervision throughout the process.
6) Very heavy supervision throughout the process.
7) Other (please specify).

41. How satisfied are you with the supervisory relationship between you and your chairman?

1	2	3	4	5
Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied

42-50. If dissatisfied, please indicate which of the following reasons contribute to your dissatisfaction:

	YES	NO	
42.	1	2	Chairman does not spend enough time with me
43.	1	2	Chairman's expectations are unclear or inconsistent
44.	1	2	Chairman inordinately delays reading and criticizing my work
45.	1	2	Chairman's standards are unrealistic
46.	1	2	Chairman's general attitude is threatening
47.	1	2	Chairman's general attitude is not helpful and supportive
48.	1	2	Chairman is not stimulating
49.	1	2	Chairman does not know my research area
50.	1	2	Other:

51. Have you had conflicts with your dissertation chairman?
1) No
2) Occasionally, but not serious
3) Yes
4) Yes, serious conflicts

51a. If yes, what is the nature of the conflicts and how are, or were, they resolved?

52. How were the members of your dissertation committee selected?
1) My chairman selected them
2) My chairman and I decided together
3) My department of program chairman selected them
4) A department committee assigned them
5) Origin of decision unclear
6) Other:

53. What has been (or do you expect to be) the general pattern of interaction between you and the members of your committee? The committee meets:
1) Only to pass on prospectus and at the oral examination
2) Only when the dissertation is completed
3) At significant junctures during research progress
4) Once a year to check on your progress
5) Once each term to check on your progress
6) Only once or twice, but I interact frequently with one or two members of the committee

54. Which of the interaction patterns outlined in question 53 do you think would be most beneficial to you?
1) 2) 3) 4) 5) 6)

55. How would you describe the role of the cognate member of your dissertation committee as it now appears? The cognate member:
1) plays a minor role in evaluating the dissertation and the final oral exam
2) plays a major role in evaluating the dissertation and a minor role in supervising my work
3) plays a major role in supervising my work but a minor role in evaluating the final product
4) plays a moderate role in both supervision and evaluation
5) plays a major role in both the evaluation and supervision of the dissertation
6) I have no experience yet.

56. Which of the role descriptions in question 55 do you think would be most beneficial to you educationally?
1) 2) 3) 4) 5)

57. Would the supervision of your dissertation be improved by the presence of a non-university professional in your field on your committee?
1) No opinion 2) No 3) It might be 4) Yes

58. How often have you encountered serious disagreements among the faculty members on your committee regarding the acceptability of your dissertation or of specific sections of it?
1) Never
2) Once in a while
3) Often
4) Too early to say

58a. If so, how were they resolved?

59. How often have you been slowed in your progress towards your degree from delays in the reading and criticism of written materials you have handed in?
1) Never 2) Once in a while 3) Often

What were the nature of these delays?

60. How many committee members, including the dissertation chairman, do you think should serve on each dissertation committee? Please state a minimum number.
1) One 2) Two 3) Three 4) Four 5) Five 6)More then five

61-70. Studies have shown that both formal and informal interactions between students and faculty members are important in the education of doctoral students. In the left hand column please indicate the importance to you of the following experiences. In the right hand column please indicate the frequency with which they occur.

1) No value	1) Never
2) Somewhat valuable	2) Occasionally
3) Of significant value	3) Often
4) Of great value	4) Very often

Colloquia with invited speaker	61.	1	2	3	4	66.	1	2	3	4
Regular seminars for students and faculty	62.	1	2	3	4	67.	1	2	3	4
Research team or group meetings	63.	1	2	3	4	68.	1	2	3	4
Colloquia where students present papers	64.	1	2	3	4	69.	1	2	3	4
Casual conversations between students and faculty	65.	1	2	3	4	70.	1	2	3	4

71. When did you begin to work on dissertation research or possible dissertation research?
1) In the early stages of course work
2) In the middle stages of course work
3) In the later stages of course work
4) After course work, before candidacy
5) After candidacy

72. When do you think students in your department should begin to work on dissertation research? (Please use the same answers as for question 71.)
1) 2) 3) 4) 5)

73. How many full-time equivalent years do you think a student should spend on the dissertation in your field (e.g., from selection of the problem through research to completion of the written document)?
1) 1/2 year
2) One year
3) 1 1/2 years
4) Two years
5) 2 1/2 years
6) 3 years
7) 3-4 years
8) More than 4 years
9) Number of years not relevant

74. Do you think that you are spending too much time on the dissertation phase of your doctoral program?
1) No 2) Perhaps 3) Yes 4) No opinion

75-78. Please rate the importance of the following as factors delaying the completion of your degree:

1) No opinion
2) Unimportant
3) Of some importance
4) Important
5) Very important

75.	Unduly long preparation for prelim examinations	1	2	3	4	5
76.	Inadequate preparation for research prior to candidacy	1	2	3	4	5
77.	Your need to acquire certain necessary research skills	1	2	3	4	5
78.	Insufficient guidance provided by dissertation chairman	1	2	3	4	5
79.	Lack of personal financial support	1	2	3	4	5
80.	Lack of funding for research costs	1	2	3	4	5
81.	Inability to work with dissertation chairman	1	2	3	4	5
82.	Difficulties in finding a topic of sufficient importance	1	2	3	4	5
83.	Difficulties in reducing topic to manageable scope	1	2	3	4	5
84.	Unrealistic perfectionism	1	2	3	4	5
85.	Selection of unexpectedly complex research problem	1	2	3	4	5
86.	Personal problems	1	2	3	4	5
87.	Inadequate motivation	1	2	3	4	5

87a. Please comment further on any points which seem particularly important with regard to the time spent on dissertations:

88. Do you think it would be desirable to shorten the dissertation phase of the doctoral program in some way?
1) No opinion
2) No
3) Perhaps
4) Definitely yes

89. Should there be a maximum time limit for working on the Ph.D.?
1) No
2) Two to four years
3) Five years
4) Six years
5) Seven years
6) Eight years
7) Nine years

90-97. Please indicate whether you agree, disagree, or have no opinion with regard to the following statements as they pertain to your own department.

1) Strongly agree
2) Agree
3) No opinion
4) Disagree
5) Strongly disagree

90. Doctoral study places too much stress on research to the detriment of other professional skills. 1 2 3 4 5

91. The intellectual scope of training in the doctoral program is too narrow. 1 2 3 4 5

92. Dissertation research is directed toward the advisor's interests at the expense of student creativity. 1 2 3 4 5

93. The student's potential for creative thinking and individual expression is not being developed in the current program. 1 2 3 4 5

94. Dissertation research is too specialized for current student needs. 1 2 3 4 5

95. Dissertation research should be more relevant to student career needs. 1 2 3 4 5

96. Greater involvement of non-academic professionals in the current degree program is desirable. 1 2 3 4 5

97. The dissertation phase should be revised to take into account the reduced demand for Ph.D.s in academic employment. 1 2 3 4 5

98. Should graduate students and/or doctoral candidates be regularly consulted in the evaluation of departmental requirements for the degree?
1) No
2) In certain but not all cases
3) Yes

99. How much will the direct costs of your dissertation research total? Include travel, equipment, etc.; exclude tuition and subsistence.
1) 0-$100
2) $100- $500
3) $500-$100
4) $100-$1500
5) $1500-$2000
6) $2000-$3000
7) $3000-$5000
8) Over $5000

100. What is your primary means of personal support as you write your dissertation?
1) Personal earnings
2) Spouse's earnings
3) Parents' support
4) Fellowship or scholarship
5) Teaching fellowship
6) Loans

101. If employed, is your employment supportive of your dissertation research?
1) Not at all
2) Very indirectly
3) Directly supportive

102. To what extent are you currently employed?
1) Quarter time or less
2) Half-time
3) Three-quarter time
4) Full time

103-115. Please evaluate the following components of the dissertation phase of the doctoral program in your department according to the scale at the right.

1) Needs substantial revision
2) Could be improved
3) No opinion
4) Adequate
5) Good

103.	Integration of research and course work	1	2	3	4	5
104.	The procedures for selecting chairman and committee	1	2	3	4	5
105.	The evaluation procedures for admitting students into doctoral work	1	2	3	4	5
106.	The prospectus procedure, selection of a problem	1	2	3	4	5
107.	Generally expected scope of research problem	1	2	3	4	5
108.	Formal arrangements for student/faculty interaction	1	2	3	4	5
109.	Informal arrangements for student/faculty meetings	1	2	3	4	5
110.	The nature of the supervisory relationship between chairman, committee and candidate	1	2	3	4	5
111.	The generally accepted set of standards regarding what a dissertation should represent	1	2	3	4	5
112.	The evaluation process for completed dissertations	1	2	3	4	5
113.	The nature and timing of the final oral examination	1	2	3	4	5
114.	The format of the written document	1	2	3	4	5
115.	The fostering of student creativity	1	2	3	4	5

116. Current Graduate School policy states that no previously published material may be included in the bound dissertation that is presented in partial fulfillment of the degree requirements. Do you anticipate that this policy will hinder you in the publication of your research?
1) No
2) Perhaps
3) Yes

117. Do you think that this policy should be changed?
1) No
2) Perhaps
3) Yes

118. Would you favor more flexible format standards for the dissertation, such as two to four substantial journal articles in place of the current model?
1) No opinion
2) No
3) Perhaps, if sufficiently substantial
4) Yes
5) Yes, and other changes might be envisioned as well

118a. Comments:

119. Do you think positive measures to increase the probability that disseration research in your department reaches publication are needed?
1) No opinion.
2) The current system in my department is adequate.
3) Publication is not a specific objective.
4) Yes, depending on what measures are proposed.
5) Yes, by all means.

119a. What suggestions would you make?

120-129. In the course of dissertation work, students and faculty come in contact with various regulations of the Graduate School. Please evaluate the following according to both right-hand and left-hand scales.

Adequacy of regulation:	Flexibility of administration:
1) No opinion	1) No opinion
2) Needs revision	2) Too much
3) Adequate	3) About right
4) Good	4) Too little

The candidacy regulations	120.	1	2	3	4	125.	1	2	3	4
The current fee structure	121.	1	2	3	4	126.	1	2	3	4
Regulations regarding written format	122.	1	2	3	4	127.	1	2	3	4
Procedures in the Dissertation Secretary's Office	123.	1	2	3	4	128.	1	2	3	4
Scheduling of various stages in the Dissertation Secretary's Office	124.	1	2	3	4	129.	1	2	3	4

129a. Have you any suggestions regarding the role of the Graduate School in the administration of doctoral research?

130. Did you have your Masters Degree when you entered your current doctoral program?
1) Yes
2) No

131. How many years, elapsed time, have you spent in your current doctoral program?
1) One to three
2) Four
3) Five
4) Six
5) Seven
6) Eight
7) Nine
8) Ten
9) Eleven or more

132. How many years, full-time equivalent, have you spent in your current doctoral program?
1) One to three
2) Four
3) Five
4) Six
5) Seven
6) Eight
7) Nine
8) Ten
9) Eleven or more

133. How many full-time equivalent years have you spent to date working on your dissertation project?
1) One-half
2) One year
3) One and a half
4) Two
5) Two and a half
6) Three
7) Three and a half
8) Four
9) More than four

134. What fraction of your dissertation work have you now completed?
1) Just beginning
2) One quarter
3) One half
4) Three quarters
5) Nearly done
6) Ready for final review by committee
7) Fully completed
8) Can't say

135/6. How many months have you been in candidacy? ____________

137. Marital status:
1) Married
2) Not-married
3) Other

138. Sex:
1) Female
2) Male

139/40. Present age: ____________

141. In what calendar year do you expect to finish your degree?
1) 1974
2) 1975
3) 1976
4) 1977
5) 1978
6) 1979 or later

142. How many dependent children have you?
1) None
2) One
3) Two
4) More than two

The committee would be grateful for any additional comments that you wish to make regarding the dissertation phase of your doctoral training.

THE UNIVERSITY OF MICHIGAN
HORACE H. RACKHAM
SCHOOL OF GRADUATE STUDIES
ANN ARBOR, MICHIGAN 48104

OFFICE OF THE DEAN

May 7, 1974

Dear Colleague:

The last formal review of the dissertation requirement at The University of Michigan occurred in 1893. This disquieting fact and widely publicized speculations regarding the future of graduate education led the Executive Board of the Graduate School to commission a faculty committee to review the role of the dissertation in doctoral study at the University. We are writing to ask your cooperation in that effort.

It is important that our recommendations reflect the experiences and considered judgments of those who have completed the dissertation at the University as well as of faculty and students in progress. To obtain this information as efficiently as possible, we have prepared the enclosed questionnaire to send to a limited sample of doctoral recipients. Since only a sample will be surveyed, your early response is of particular importance. The questionnaire requires about 30 minutes to complete. We will be grateful for more lengthy responses if you have time, but as a minimum may we request that you fill out the standardized questions.

Your responses are confidential. We are not asking for names: only statistical information will be supplied to your department. Individually identifiable statistics will be obscured before being passed on.

Please circle only one response number for each question. We have provided space for comments regarding certain issues, and we hope you will discuss further any points that seem important. The last page is left blank for that purpose.

Please return the questionnaire in the enclosed envelope within one week. No postage is necessary if mailed in the United States.

Thank you for your cooperation. Your responses will provide invaluable information to your department and to the University as decisions are made regarding the dissertation phase of the doctoral degree.

Cordially,

Richard H Sands

Professor Richard Sands, Chairman

The Committee:
Ms. Joan Edwards, Zoology
Dean Wade Ellis, Graduate School
Prof. Ilene Forsyth, History of Art
Prof. Joseph Payne, Education
Ms. Mary Robischon, History
Prof. Richard Sands, Physics
Prof. Edward Walker, Psychology
Prof. Charles Witke, Classical Studies
Prof. Chia-Shun Yih, Engineering

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QUESTIONNAIRE ON THE DISSERTATION PHASE OF THE PH.D.
ALUMNI
MAY, 1974

1-6. In what department did you write your dissertation? ______________________________

7-18. To what extent should the following objectives for the dissertation be emphasized?

1	2	3	4	5	6	7
No opinion	No emphasis →					great emphasis

7. To make a substantive contribution to knowledge 1 2 3 4 5 6 7
8. To acquire broadly useful research skills 1 2 3 4 5 6 7
9. To develop and demonstrate the capability of making future contributions to knowledge 1 2 3 4 5 6 7

10. To develop and demonstrate high-level problem solving skills 1 2 3 4 5 6 7
11. To acquire a broad and general knowledge of a research area in your discipline 1 2 3 4 5 6 7
12. To learn the literature and skills relevant to a specific research problem 1 2 3 4 5 6 7

13. To learn to organize and communicate research 1 2 3 4 5 6 7
14. To generate publishable work 1 2 3 4 5 6 7
15. To develop the ability to identify important research problems 1 2 3 4 5 6 7

16. To relate research to activities such as teaching and course organization 1 2 3 4 5 6 7
17. To observe, as an apprentice, the research activities of a scholar by working along with him/her 1 2 3 4 5 6 7
18. To develop judgment and standards about the nature and quality of other people's research 1 2 3 4 5 6 7

18a. Have you any further observations about appropriate objectives for the dissertation?

19. How relevant to your career has your dissertation research been?
1) Don't know
2) Not at all relevant or helpful
3) Relevant in a general way
4) Directly relevant but not essential to specific
5) Directly relevant and essential to career

20-21. Which one of the following categories best represents your current employer?
1) Ph.D. granting university
2) Four-year college or university (no or few doctoral programs)
3) Community or Jr. college
4) Elementary or secondary school
5) Federal government
6) State or local government
7) Non-profit organization
8) Industry of business
9) Self-employed
10) Unemployed
11) Other:

22-23. If you have had a previous position since receiving the doctorate, which category best represents that position? Use the choices in question 20-21, and indicate only the most recent previous position if there are more than one.
1 2 3 4 5 6 7 8 9 10 11

24-25. Please circle your primary work activity in the first column (24) and your secondary work activity, if any, in the second column (25). Circle one in each column.

	Primary	Secondary
Basic Research	1	1
Development and applied research	2	2
Teaching	3	3
Administration	4	4
Professional services	5	5
Other	6	6

26. Did you have a post-doctoral fellowship after obtaining the Ph.D.?
1) Yes 2) No

27. How much difficulty did you have finding suitable employment after obtaining the Ph.D.?
0 1 2 3 4 5 6
No difficulty ⟶ Great Difficulty

28. Do you feel you are under-employed in your current position?
1) No 2) Somewhat 3) Yes 4) Grossly under-employed

28a. If under-employed, in what specific respects?

29. If you are employed in an academic setting, what is your tenure status?
1) Don't have tenure, and probably won't get tenured.
2) Don't have tenure, unclear whether it will be granted.
3) Don't have tenure, but expect to get it.
4) Have tenure.
5) Tenure is not granted at my institution.

29a. If you anticipate difficulties obtaining tenure, what are the reasons?

Could the University of Michigan do anything to help future students avoid similar difficulties?

30. What pattern of supervision characterized your relationship with your dissertation chairman? Mark the most appropriate category.
1) Only the final stages of the project.
2) At the initial and final stages of the project.
3) Throughout the process, but concentrated at the beginning and end.
4) Moderate supervision occurring evenly through the entire process.
5) Moderately heavy supervision throughout the process.
6) Very heavy supervision throughout the process.
7) Other (please specify).

31. How satisfied are you with the supervision you received for your dissertation?

1	2	3	4	5
Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied

32-40. If dissatisfied, please indicate which of the following reasons contribute to your dissatisfaction:

	YES	NO	
32.	1	2	Chairman did not spend enough time with me
33.	1	2	Chairman's expectations were unclear or inconsistent
34.	1	2	Chairman inordinately delayed reading and criticizing my work
35.	1	2	Chairman's standards were unrealistic
36.	1	2	Chairman's general attitude was threatening
37.	1	2	Chairman's general attitude was not helpful and supportive
38.	1	2	Chairman was not stimulating
39.	1	2	Chairman did not know my research area
40.	1	2	Other:

41. Did you have conflicts with your dissertation chairman?
    1) No
    2) Occasionally, but not serious
    3) Yes
    4) Yes, serious conflicts

41a. If yes, what was the nature of the conflicts and how were they resolved?

42. How were the members of your dissertation committee selected?
    1) My chairman selected them
    2) My chairman and I decided together
    3) My department or program chairman selected them
    4) A department committee assigned them
    5) Origin of decision unclear
    6) Other:

43. Which of the following best describes the general pattern of interaction between you and the members of your committee? The committee met:
    1) Only to pass on prospectus and at the oral examination
    2) Only when the dissertation was completed
    3) At significant junctures during research progress
    4) Once a year to check on your progress
    5) Once each term to check on your progress
    6) Only one or twice, but I interacted frequently with one or two members of the committee

44. Which of the interaction patterns outlined in question 43 do you think would have been most beneficial to you?
    1) 2) 3) 4) 5) 6)

45. How would you describe the role of the cognate member of your dissertation committee? The cognate member:
    1) Played a minor role in evaluating the dissertation and the final oral exam
    2) Played a major role in evaluating the dissertation and a minor role in supervising my work
    3) Played a major role in supervising my work but a minor role in evaluating the final product
    4) Played a moderate role in both supervision and evaluation
    5) Played a major role in both the evaluation and supervision of the dissertation
    6) Other:

46. Which of the role descriptions in question 45 do you think would have been most beneficial to you?
1) 2) 3) 4) 5)

47. Would the supervision of your dissertation have been improved by the presence of a non-university professional in your field on your committee?
1) No opinion 2) No 3) Possibly 4) Yes

48. To what extent did the faculty members on your dissertation committee disagree about the acceptability of your dissertation or sections of the dissertation?
1) No disagreement
2) Minor disagreement
3) Some significant disagreement
4) Serious disagreement occurred
5) Don't know

48a. If you circled 3 or 4 above, how was the disagreement resolved?

49. Was your progress towards your degree slowed from delays in the reading and criticism of written materials you
1) Never 2) Once in a while 3) Often

What were the nature of these delays?

50. How many committee members, including the dissertation chairman, do you think should serve on each dissertation committee? Please state a minimum number.
1) One 2) Two 3) Three 4) Four 5) Five 6) More than five

51-60. Studies have shown that both formal and informal interactions between students and faculty members are important in the education of doctoral students. In the left hand column please indicate the importance to you of the following experiences. In the right hand column please indicate the frequency with which they occurred.

1) No value
2) Somewhat valuable
3) Of significant value
4) Of great value

1) Never
2) Occasionally
3) Often
4) Very often

Colloquia with invited speakers	51.	1	2	3	4	56.	1	2	3	4
Regular seminars for students and faculty	52.	1	2	3	4	57.	1	2	3	4
Research team or group meetings	53.	1	2	3	4	58.	1	2	3	4
Colloquia where students present papers	54.	1	2	3	4	59.	1	2	3	4
Casual conversations between students and faculty	55.	1	2	3	4	60.	1	2	3	4

61. When did you begin to work on dissertation research or possible dissertation research?
1) In the early stages of course work
2) In the middle stages of course work
3) In the later stages of course work
4) After course work, before candidacy
5) After candidacy

62. When do you think students in your department should begin to work on dissertation research? Please use the same answers as for question 61.
1) 2) 3) 4) 5)

63. How many full-time equivalent years do you think a student should spend on the dissertation in your field (e.g., from selection of the problem through research to completion of the written document)?

1) 1/2 year
2) One year
3) 1 1/2 years
4) Two years
5) 2 1/2 years
6) 3 years
7) 3-4 years
8) More than 4 years
9) Number of years not relevant

64. Do you think that you spent too much time on the dissertation phase of your doctoral program?

1) No 2) Perhaps 3) Yes 4) No opinion

65-77. Please rate the importance of the following as factors delaying the completion of your degree:

1) No opinion
2) Unimportant
3) Of some importance
4) Important
5) Very important

65. Unduly long preparation for prelim examinations	1	2	3	4	5
66. Inadequate preparation for research prior to candidacy	1	2	3	4	5
67. Your need to acquire certain necessary research skills	1	2	3	4	5
68. Insufficient guidance provided by dissertation chairman	1	2	3	4	5
69. Lack of personal financial support	1	2	3	4	5
70. Lack of funding for research costs	1	2	3	4	5
71. Inability to work with dissertation chairman	1	2	3	4	5
72. Difficulties in finding a topic of sufficient importance	1	2	3	4	5
73. Difficulties in reducing topic to manageable scope	1	2	3	4	5
74. Unrealistic perfectionism	1	2	3	4	5
75. Selection of unexpectedly complex research problem	1	2	3	4	5
76. Personal problems	1	2	3	4	5
77. Inadequate motivation	1	2	3	4	5

77a. Please comment further on any points which seem particularly important with regard to the time spent on dissertations:

78. Do you think it would be desirable to shorten the dissertation phase of the doctoral program in some way?

1) No opinion
2) No
3) Perhaps
4) Definitely yes

79. Should there be a maximum time limit for working on the PH.D.?

1) No
2) Two to four years
3) Five years
4) Six years
5) Seven years
6) Eight years
7) Nine years

80-87. Please indicate whether you agree, disagree, or have no opinion with regard to the following statements as they pertain to the department from which you received your doctorate.

1) Strongly agree
2) Agree
3) No opinion
4) Disagree
5) Strongly disagree

80. Doctoral study placed too much stress on research to the detriment of other professional skills. 1 2 3 4 5

81. The intellectual scope of training in the doctoral program was too narrow. 1 2 3 4 5

82. Dissertation research was directed toward the advisor's interests at the expense of student creativity. 1 2 3 4 5

83. The student's potential for creative thinking and individual expression was not developed in the program. 1 2 3 4 5

84. Dissertation research was too specialized for student needs. 1 2 3 4 5

85. Dissertation research should be more relevant to student career needs. 1 2 3 4 5

86. Greater involvement of non-academic professionals in the degree program would have been helpful. 1 2 3 4 5

87. The dissertation phase today should be revised to take into account the reduced demand for PH.D.s in academic employment. 1 2 3 4 5

88. How much did the direct costs of your dissertation research total? Include travel, equipment, etc.; exclude tuition and subsistence.

1) 0-$100
2) $100-$500
3) $500-$1000
4) $1000-$1500
5) $1500-$2000
5) $2000-$3000
7) $3000-$5000
8) Over $5000

89. What was the chief source of funds you used to pay these costs?

1) Normal departmental funds
2) University research grants
3) Federal grants
4) Other grants
5) Personal funds
6) Other: (please specify)

90. What was your primary means of personal support as you wrote your dissertation?

1) Personal earnings
2) Spouse's earnings
3) Parents' support
4) Fellowship or scholarship
5) Teaching fellowship
6) Research assistantship
7) Loans

91. If you were employed, was your employment supportive of your dissertation research?

1) Not at all
2) Very indirectly
3) Directly supportive

92. To what extent were you employed while writing your dissertation?

1) Quarter time or less
2) Half-time
3) Three-quarter time
4) Full time

93-105. Please evaluate the following components of the dissertation phase of the doctoral program in your department according to the scale at the right.

1) Needs substantial revision
2) Could be improved
3) No opinion
4) Adequate
5) Good

93. Integration of research and course work	1	2	3	4	5
94. The procedures for selecting chairman and committee	1	2	3	4	5
95. The evaluation procedures for admitting students into doctoral work	1	2	3	4	5
96. The prospectus procedure, selection of a problem	1	2	3	4	5
97. Generally expected scope of research problem	1	2	3	4	5
98. Formal arrangements for student/faculty interaction	1	2	3	4	5
99. Informal arrangements for student/faculty meetings	1	2	3	4	5
100. The nature of the supervisory relationship between chairman, committee and candidate	1	2	3	4	5
101. The generally accepted set of standards regarding what a dissertation should represent	1	2	3	4	5
102. The evaluation process for completed dissertations	1	2	3	4	5
103. The nature and timing of the final oral examination	1	2	3	4	5
104. The format of the written document	1	2	3	4	5
105. The fostering of student creativity	1	2	3	4	5

106. Has your dissertation been published or will it soon be published in part or in whole?
1) Yes, as one of more journal articles.
2) Yes, as a brief research report.
3) Yes, as a monograph.
4) Yes, as a full book.
5) No.

107. How many scholarly publications of journal article length or greater do you have?
0) None 1) One 2) Two 3) Three 4) Four to six 5) Seven or more

108. Current Graduate School policy states that no previously published material may be included in the bound dissertation that is presented in partial fulfillment of degree requirements. Did this policy hinder you in any way?
1) No 2) Yes, but not seriously 3) Yes, it caused serious inconvenience.

109. Do you think this policy should be changed?
1) No 2) Perhaps 3) Yes

110. Would you favor more flexible format standards for the dissertation, such as two to four substantial journal articles in place of the current model?
1) No opinion
2) No
3) Perhaps if sufficiently substantial
4) Yes
5) Yes, and other changes might be envisioned as well

110a. Comments:

111. Do you think postiive measures are needed to increase the probability that dissertation research in your department reaches publication?
1) No opinion
2) The current system in my department is adequate.
3) Publication is not a specific objective.
4) Yes, depending on what measures are proposed.
5) Yes, by all means.

111a. What specific suggestions do you have?

112-119. In the course of dissertation work, students and faculty come in contact with various regulations of the Graduate School. Please evaluate the following according to both right-hand and left-hand scales on the basis of your own experience.

Adequacy of regulation:	Flexibility of administration:
1) No opinion	1) No opinion
2) Needs revision	2) Too much
3) Adequate	3) About right
4) Good	4) Too little

The candidacy regulations	112. 1	2	3	4	116. 1	2	3	4
Regulations regarding written format	113. 1	2	3	4	117. 1	2	3	4
Procedures in the Dissertation Secretary's office	114. 1	2	3	4	118. 1	2	3	4
Scheduling of various stages in the Dissertation Secretary's office	115. 1	2	3	4	119. 1	2	3	4

119a. Have you any suggestions regarding the role of the Graduate School in the administration of doctoral research?

120. Should graduate students and/or doctoral candidates be regularly consulted in the evaluation of departmental requirements for the degree?
1) No 2) In certain, but not all cases 3) Yes

121. Are you satisfied with the influence you (or your student cohort) had on degree requirements in your department?
1) Very dissatisfied 2) Dissatisfied 3) Neutral 4) Satisfied 5) Very satisfied

122. Did you have a Master's degree when you entered your doctoral program?
1) Yes 2) No

123. How many years, elapsed time, did you spend in your doctoral program?
1) One to three
2) Four
3) Five
4) Six
5) Seven
6) Eight
7) Nine
8) Ten
9) Eleven or more

124. How many years, full-time equivalent, did you spend in your doctoral program?
1) One to three
2) Four
3) Five
4) Six
5) Seven
6) Eight
7) Nine
8) Ten
9) Eleven or more

125. How many full-time equivalent years did you spend working on your dissertation?

1) One-half year	6) Three
2) One	7) Three and a half
3) One and a half	8) Four
4) Two	9) More than four
5) Two and a half	

126. Which of the following best describes your experience with part-time work in your field since you received the doctorate?
1) Never sought or received less than a full-time position.
2) Sought part-time work, but couldn't find a satisfactory part-time position.
3) Sought full-time work, but had to settle for a part-time appointment.
4) Sought and found part-time work, but now work full-time.
5) Now hold a part-time position.

127. If you have sought part-time employment in your field, how much difficulty did you have securing a suitable position?

0 1 2 3 4 5 6

No Difficulty ⟶ A great deal of difficulty

128. Do you anticipate seeking part-time employment in the future?
1) No 2) Perhaps 3) Yes, for a few years 4) Yes, for an extended period

129. How did you select your dissertation chairman:
1) My chairman invited me to study with him or her.
2) It was a joint decision between me and my chairman.
3) A department committee made the selection.
4) Origin of the selection is unclear.
5) Other:

130. How did you decide on a dissertation topic?
1) My dissertation chairman assigned it.
2) My dissertation chairman proposed several topics and I selected one.
3) I proposed several topics and my chairman guided me towards a manageable topic.
4) My choice was determined by the availability of funds for research.
5) I do not have a topic yet.

131-132. In what calendar year did you finish your degree? ______________________

133-134. What was your age when you completed your degree? ______________________

135. Which of the following did you receive?
1) Ph.D. 2) Ed.D. 3) A.Mus.D. 4) Arch. D. 5) D. Sc. 6) A.D. 7) Other

136. How many dependent children did you have when you completed the degree?
1) None 2) One 3) Two 4) More than two

137. Sex:
1) Female 2) Male

138. Marital status when writing your dissertation:
1) Married 2) Not married 3) Other

The committee would be grateful for any other comments you may wish to add.

rs
4/29/74